Manual

FlexRay Interface Family

VN7570 / VN7572 / VN7600 / VN7610

Version 5.0

English

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1 Introduction

In this chapter you find the following information:

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1.1 Safety Instructions and Hazard Warnings

Caution: In order to avoid personal injuries and damage to property, you have to read and understand the following safety instructions and hazard warnings prior to installation and use of this interface. Keep this documentation (manual) always near the interface.

1.1.1 Proper Use and Intended Purpose

Caution: The interface is designed for analyzing, controlling and otherwise influencing control systems and electronic control units. This includes, inter alia, bus systems like CAN, LIN, K-Line, MOST, FlexRay, Ethernet and/or BroadR-Reach.

The interface may only be operated in a closed state. In particular, printed circuits must not be visible. The interface may only be operated (i) according to the instructions and descriptions of this manual; (ii) with the electric power supply designed for the interface, e.g. USB-powered power supply; and (iii) with accessories manufactured or approved by Vector.

The interface is exclusively designed for use by skilled personnel as its operation may result in serious personal injuries and damage to property. Therefore, only those persons may operate the interface who (i) have understood the possible effects of the actions which may be caused by the interface; (ii) are specifically trained in the handling with the interface, bus systems and the system intended to be influenced; and (iii) have sufficient experience in using the interface safely.

The knowledge necessary for the operation of the interface can be acquired in workshops and internal or external seminars offered by Vector. Additional and interface specific information, such as „Known Issues“, are available in the „Vector KnowledgeBase“ on Vector´s website at www.vector.com. Please consult the „Vector KnowledgeBase“ for updated information prior to the operation of the interface.

1.1.2 Hazards

Caution: The interface may control and/or otherwise influence the behavior of control systems and electronic control units. Serious hazards for life, body and property may arise, in particular, without limitation, by interventions in safety relevant systems (e.g. by deactivating or otherwise manipulating the engine management, steering, airbag and/or braking system) and/or if the interface is operated in public areas (e.g. public traffic, airspace). Therefore, you must always ensure that the interface is used in a safe manner. This includes, inter alia, the ability to put the system in which the interface is used into a safe state at any time (e.g. by „emergency shutdown“), in particular, without limitation, in the event of errors or hazards.

Comply with all safety standards and public regulations which are relevant for the operation of the system. Before you operate the system in public areas, it should be tested on a site which is not accessible to the public and specifically prepared for performing test drives in order to reduce hazards.

1.1.3 Disclaimer

Caution: Claims based on defects and liability claims against Vector are excluded to the extent damages or errors are caused by improper use of the interface or use not according to its intended purpose. The same applies to damages or errors arising from insufficient training or lack of experience of personnel using the interface.

1.2 About this User Manual

Conventions

In the two following charts you will find the conventions used in the user manual regarding utilized spellings and symbols.

Style	Utilization
bold	Blocks, surface elements, window- and dialog names of the software. Accentuation of warnings and advices. **[OK]** Push buttons in brackets **File|Save** Notation for menus and menu entries
Microsoft	Legally protected proper names and side notes.
`Source Code`	File name and source code.
Hyperlink	Hyperlinks and references.
<CTRL>+<S>	Notation for shortcuts.

Symbol	Utilization
	Here you can obtain supplemental information.
	This symbol calls your attention to warnings.
	Here you can find additional information.
	Here is an example that has been prepared for you.
	Step-by-step instructions provide assistance at these points.
	Instructions on editing files are found at these points.
	This symbol warns you not to edit the specified file.

1.2.1 Certification

Certified Quality Management System

Vector Informatik GmbH has ISO 9001:2008 certification. The ISO standard is a globally recognized standard.

1.2.2 Warranty

Restriction of warranty

We reserve the right to change the contents of the documentation and the software without notice. Vector Informatik GmbH assumes no liability for correct contents or damages which are resulted from the usage of the documentation. We are grateful for references to mistakes or for suggestions for improvement to be able to offer you even more efficient products in the future.

1.2.3 Registered Trademarks

Registered trademarks

All trademarks mentioned in this documentation and if necessary third party registered are absolutely subject to the conditions of each valid label right and the rights of particular registered proprietor. All trademarks, trade names or company names are or can be trademarks or registered trademarks of their particular proprietors. All rights which are not expressly allowed are reserved. If an explicit label of trademarks, which are used in this documentation, fails, should not mean that a name is free of third party rights.

➔ Windows, Windows 7, Windows 8.1 are trademarks of the Microsoft Corporation.

2 FlexRay Interface Family

In this chapter you find the following information:

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2.1 General Information

FlexRay Interfaces

The FlexRay interface family offers a future-proofed and powerful solution for development, simulation, test, measurement or calibration of FlexRay networks through an FPGA-based FlexRay communication controller.

The devices are able to transmit and receive data as well as null frames. The detection of invalid frames on the bus is also possible. Future features can be added in the field by Software and FPGA updates.

Figure 1: Devices of the FlexRay interface family

The FPGA-based Startup Monitoring is particularly helpful at the beginning of a FlexRay development. It allows you to detect FlexRay frames and symbols, even before the communication controller has synchronized itself to the bus. This also facilitates the analysis of problems in the bus configuration. Another advantage of the independent Startup Monitoring unit is that it can be operated at the same time as the communication controller. This allows you to do both Startup Monitoring and normal transmit operation without restart.

You can easily test non-coldstart nodes with only one interface. For this purpose the FlexRay interface family offers you a second communication controller.

Bus configuration

The FlexRay interfaces use bus transceivers on replaceable plug-in boards (Piggybacks). Hence, the FlexRay interfaces are well prepared for future use.

2.2 Features

Further properties

The highlights at a glance:

- Detailed analysis of the FlexRay communication through the FPGA-based communication controller
- Simulation of comprehensive networks due to the 2 MB transmission memory (parallel configuration of more than 1000 send messages)
- Coldstart of the FlexRay cluster without needing to add a network node
- FlexRay channel A and B
- Analysis of the network startup via an independent monitoring unit
- Dynamic reconfiguration of the CC buffers
- Transmission and reception of data and null frames
- Detection of invalid frames
- Cycle multiplexing
- Support of the maximum payload of 254 bytes
- In-cycle response
- Hardware-based incrementing of a payload area
- Support of PDUs
- Time synchronization
- Trigger input and output (not supported in all devices)
- Low PC loading due to DMA (Direct Memory Access)

3 VN7570

In this chapter you find the following information:

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3.1 Main Features

VN7570 (PCIe)

The VN7570 is a FlexRay/CAN/LIN/IO network interface for use with a PCIe slot.

Main features:

- 1x D-SUB62 connector for FlexRay, CAN/LIN and IO
- 1x Binder connector for hardware time synchronization
- 1x internal connector for hardware time synchronization
- 1x plug-in location for CAN/LINpiggies or FR compact Piggybacks (CH1)
- 3x plug-in locations for CAN/LINpiggies (CH2…CH4)
- 4x on-board CAN high-speed 1051cap transceivers (capacitively decoupled, CH5…CH8)
- 1x plug-in location for IOpiggy (digital/analog input/output)

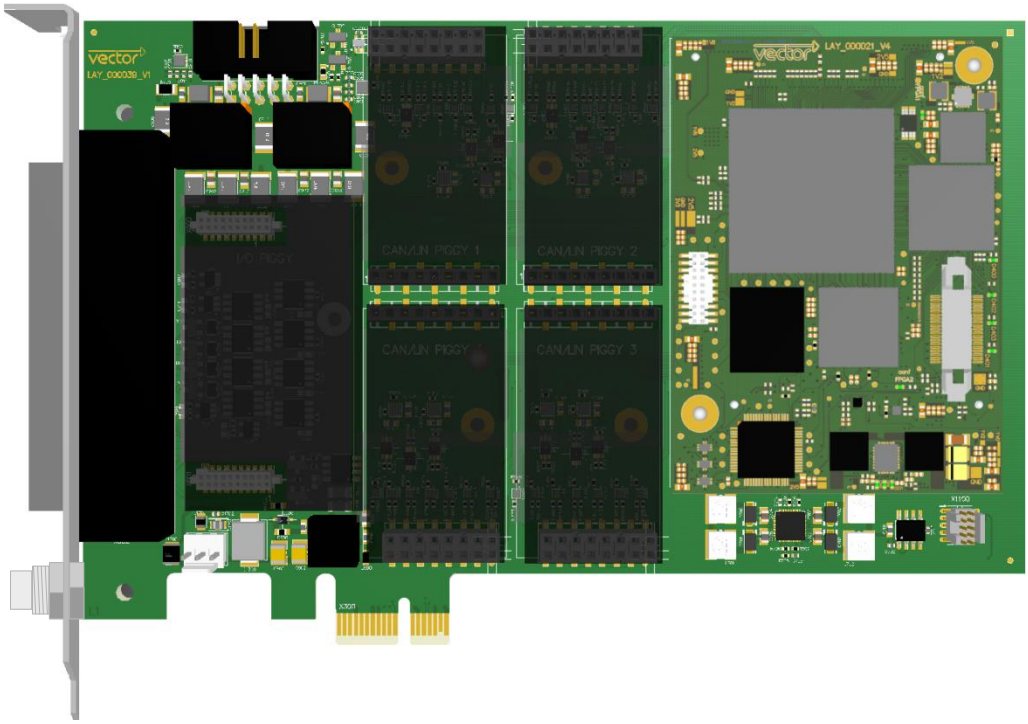


Figure 2: VN7570

3.2 Accessories

Reference: Further information on the available accessories can be found in the separate accessories manual on the driver CD in `\Documentation\Accessories`.

3.3 Getting Started

3.3.1 Step 1: Driver Installation

Please use the drivers from the included Vector Driver Disk.

1. Execute **Vector Driver Setup** from the autostart menu or directly from `\Drivers\Setup.exe` before the VN7570 is inserted into an empty PCIe slot. If you have already inserted the VN7570, the **Windows found new Hardware** wizard appears. Close this wizard and then execute the driver setup.
2. Finish the driver installation with the setup.

Note: Further information on the driver installation can be found on page 58.

3.3.2 Step 2: Device Preparation

Bus types

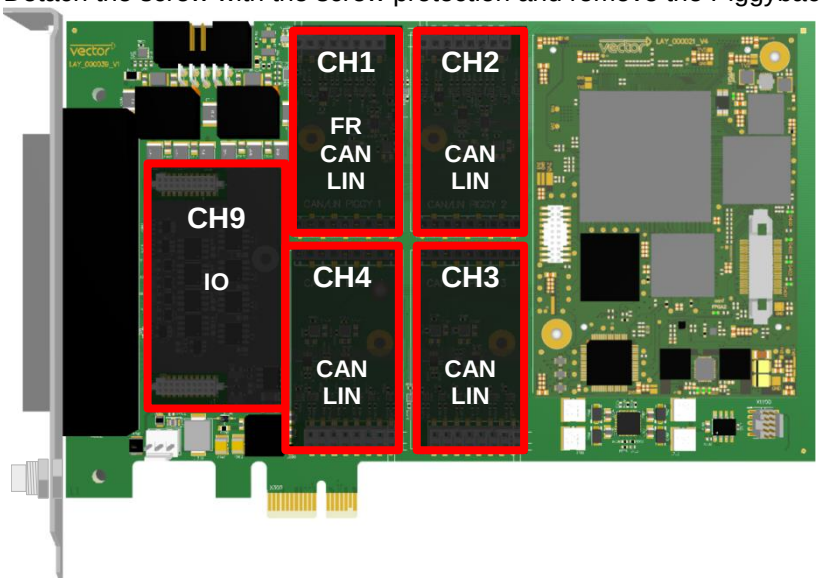
In order to connect the device to the FlexRay/CAN/LIN/K-Line bus, one or more Piggybacks with suitable transceivers have to be inserted before. For CAN there are also on-board transceivers available. A list of compatible Piggybacks can be found in the accessories manual on the driver CD in `\Documentation\Accessories`.

Note: LINpiggies have to be inserted after CANpiggies (in descending order). If you intend to use only one LINpiggy, please use the last plug-in location (CH4). J1708 should be handled like CAN. Please refer to section Bus Configuration on page 21 for further details.

If an FRpiggyC is inserted (CH1), only two additional LINpiggies can be used (CH3/CH4). A third LINpiggy at CH2 returns a configuration error in **Vector Hardware Config**.

Please follow these instructions if no Piggyback is inserted or if another Piggyback needs to be inserted. Do not touch the bottom and the topside of the PCBs (VN7570 main board and Piggybacks) to prevent electrical damage.

1. Detach the screw with the screw protection and remove the Piggyback **carefully**.



2. Insert the replacement Piggyback. The connectors must fit and must not be displaced laterally.
3. The Piggyback has to be fixed again with the screw and the screw protection.

3.3.3 Step 3: Device Installation

Caution: Turn off the main power supply and disconnect your computer's power cord. Otherwise systems using an ATX power supply unit with soft power off may still be powering the PCIe slot. This can damage your PCIe card when it is inserted into the slot.

Caution: Do not force the VN7570 into the slot. Make sure that the connectors of the card's PCIe connector are aligned with the bus connector on the motherboard before you insert the card into the slot. If it does not fit properly, gently remove it and try again.

Info: Please observe all safety precautions prescribed by your PC manufacturer for card installation!

Info: Do not touch the bottom and the topside of the PCBs (VN7570 main board and Piggybacks) to prevent electrical damage during assembly.

1. Install the drivers as described before.
2. Turn off the computer and all peripheral devices.
3. Unplug the power cord from the wall outlet.
4. Touch a metal plate on your computer to ground yourself to discharge any static electricity.

5. Remove the computer cover and the metal brackets from an unused slot.
6. Align the VN7570 with the PCIe slot and press it gently but firmly into the slot.
7. Replace the computer cover.
8. Plug in the power cord.
9. Turn on the computer.

3.3.4 Step 4: Device Configuration

Configuration

Before the installed device can be used in an application (e. g. CANalyzer, CANoe), it has to be properly configured for the needed use case.

This configuration and management of all installed Vector devices is done with the **Vector Hardware Config** tool which comes with the driver installation. The tool can be found in: **Windows | Start | Settings | Control Panel | Vector Hardware**.

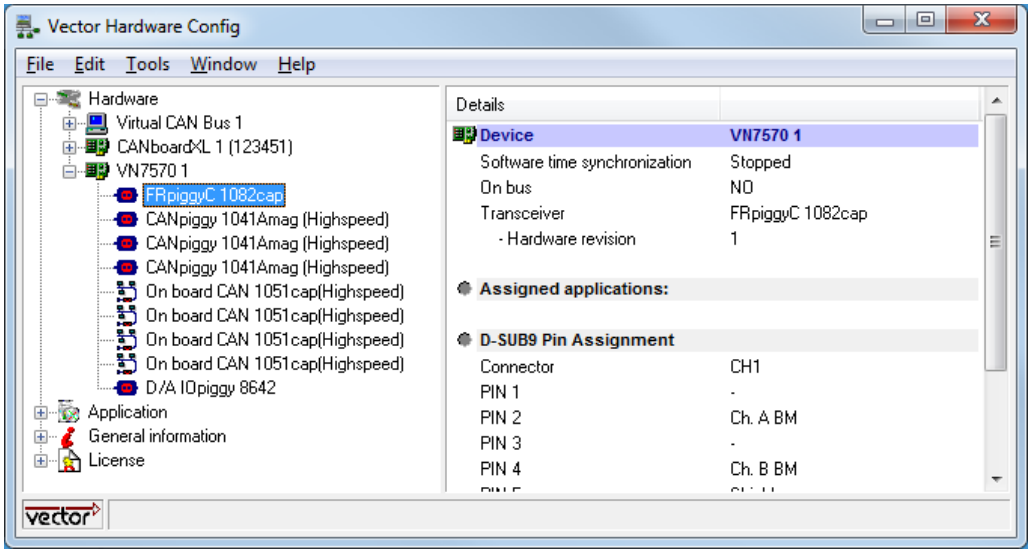


Figure 3: Configuring the device

For the quick test described in this manual no further configuration is required.

Note: Further details on the **Vector Hardware Config** tool can be found on page 63.

3.3.5 Step 5: Quick Test

Note: Please refer to the loop test for FlexRay and CAN described in the installation instructions (see page 58).

3.4 Device Description

3.4.1 Connectors

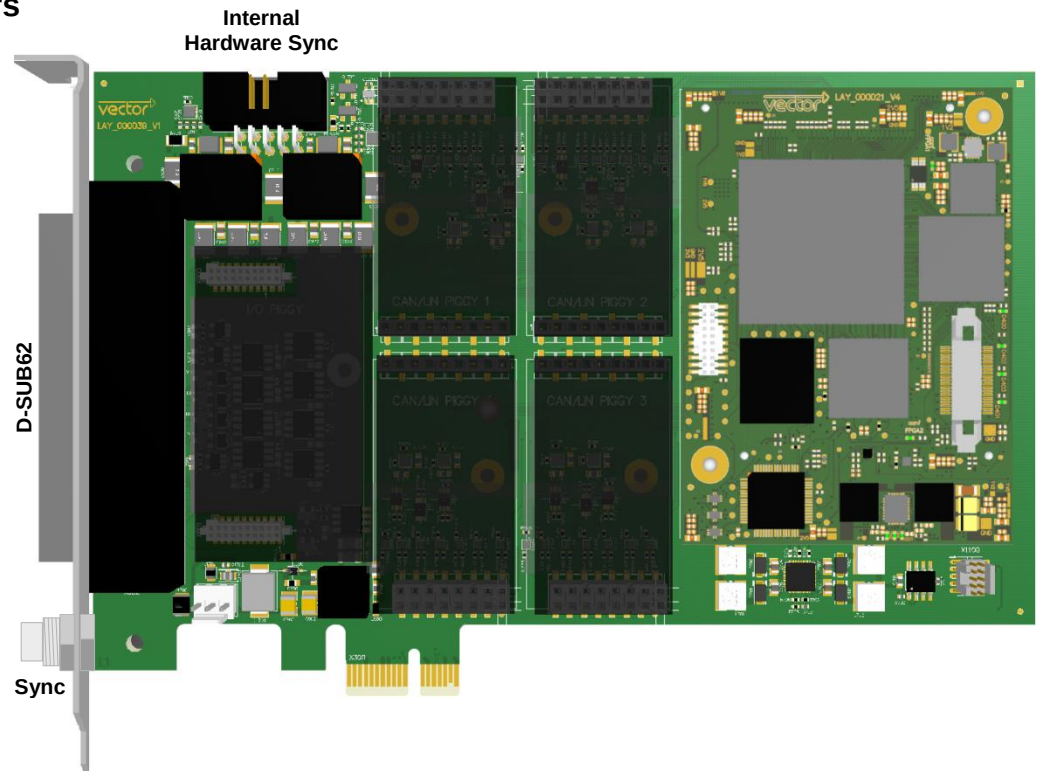


Figure 4: VN7570 connectors

➔ **D-SUB62**
The D-SUB62 connector provides all input and output pins of the inserted Piggybacks including the on-board CAN transceivers. The pins of the D-SUB62 connector are grouped as follows:

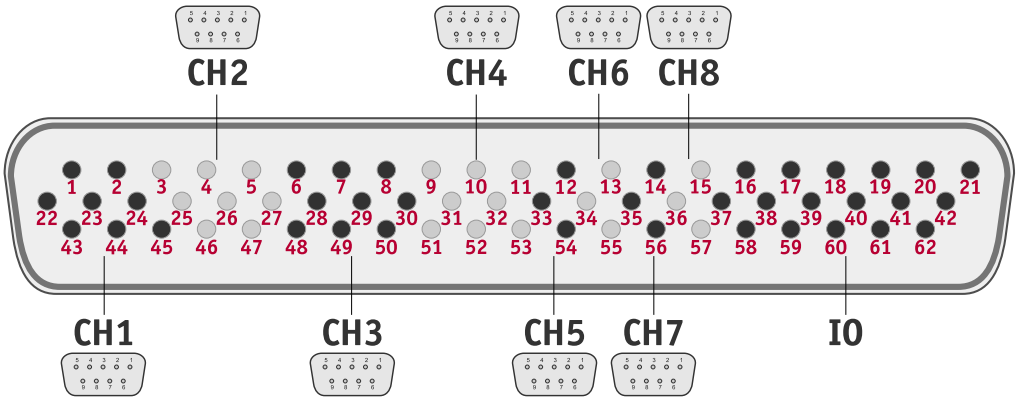


Figure 5: D-SUB62 connector pin assignments

The pin assignments of CH1…CH4 depend on the inserted Piggybacks. CH5…CH8 are assigned to the on-board CAN transceivers. The remaining pins are reserved for IO purposes and are assigned to the IOpiggy.

D-SUB62/9 Matrix

Piggyback					On-board CAN				
CH 1	CH 2	CH 3	CH 4	D-SUB9	CH 5	CH 6	CH 7	CH 8	D-SUB9
45	47	50	53	(1)*	-	-	-	-	(1) N. c.
22	3	28	9	(2)*	12	13	14	15	(2) CAN Low
1	25	7	31	(3)*	54	55	56	57	(3) GND
23	4	29	10	(4)*	-	-	-	-	(4) N. c.
6	6	6	6	(5)*	6	6	6	6	(5) Shield
2	26	8	32	(6)*	-	-	-	-	(6) N. c.
24	5	30	11	(7)*	33	34	35	36	(7) CAN High
43	27	48	51	(8)*	-	-	-	-	(8) N. c.
44	46	49	52	(9)*	-	-	-	-	(9) N. c.

* Depends on the inserted Piggyback.
Further information can be found in the separate accessories manual on the driver CD.

N. c.: Not connected

Trigger pin

→ **Trigger output**
If an FRpiggy 1082cap is inserted (CH1), pin 45 of the D-SUB62 connector can be used as trigger output (low active, 5V/GND, max. input current 200 mA). The configuration of the trigger is set in the application (e. g. CANoe).

Reference: Information on suitable cables and adapters can be found in the separate accessories manual on the driver CD in `\Documentation\Accessories`.

IO pins (IOpiggy)

If an IOpiggy is inserted the pin assignment at the D-SUB62 connector is as follows:

Pin	Pinout 1	Pinout 2	Pinout 3	Pinout 4
16	Digital In 1	Digital Out 1[1]	Digital Out 1[2]	-
17	Digital In 3	Digital Out 3[1]	Digital Out 3[2]	-
18	Digital In 5	Digital Out 4b[3]	-	-
19	Digital In 7	Digital Out 5b[3]	-	-
20	Digital GND			
37	Digital In 0	Digital Out 0[1]	Digital Out 0[2]	PWM 1
38	Digital In 2	Digital Out 2[1]	Digital Out 2[2]	-
39	Digital In 4	Digital Out 4a[3]	-	-
40	Digital In 6	Digital Out 5a[3]	-	-
41	PWM 0	Capture	-	-
58	Analog GND			
59	Analog In 0	Analog Out 0[1]	-	-
60	Analog In 1	Analog Out 1[1]	-	-

Pin	Pinout 1	Pinout 2	Pinout 3	Pinout 4
61	Analog In 2	-	-	-
62	Analog In 3	-	-	-

[1] Push-Pull
[2] Open-Drain
[3] a/b line: Relay switched, external signal at a is switched to b

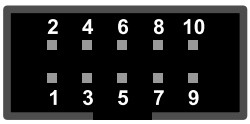
Note: Further details on the internal wiring at each IO pin can be found in the separate accessories manual on the driver CD (see section IOpiggy).

→ **Sync**
This connector (Binder type 711) can be used for time synchronization of different Vector devices (see page 52).

Pin	Assignment
1	Not connected
2	Synchronization line (low active)
3	GND

→ **Internal hardware sync connector**
Multiple VN7570 can also be synchronized via the internal 10-pin connector (angled) above the IOpiggy slot. For synchronization a ribbon cable with a 10-pin standard connector is required.

Pin	Assignment
1	GND
2..8	Reserved. Do not connect.
9	Synchronization line (low active)
10	Internal sync supply (output 5 V, 35 mA)



Info: The simultaneous use of the external and internal time synchronization between two devices is not possible.

3.4.2 Bus Configuration

Piggybacks for CH1…CH4

The VN7570 offers four Piggyback plug-in locations (CH1…CH4). Depending on requirements, **electrically** decoupled FlexRay (only CH1), CAN High-Speed, CAN Low-Speed, CAN Single Wire, J1708 or LIN transceivers may be used. In addition, four electrically decoupled built-in CAN TJA1051 (high-speed) transceivers are available (CH5…CH8). The remaining pins are reserved for dedicated IO tasks.

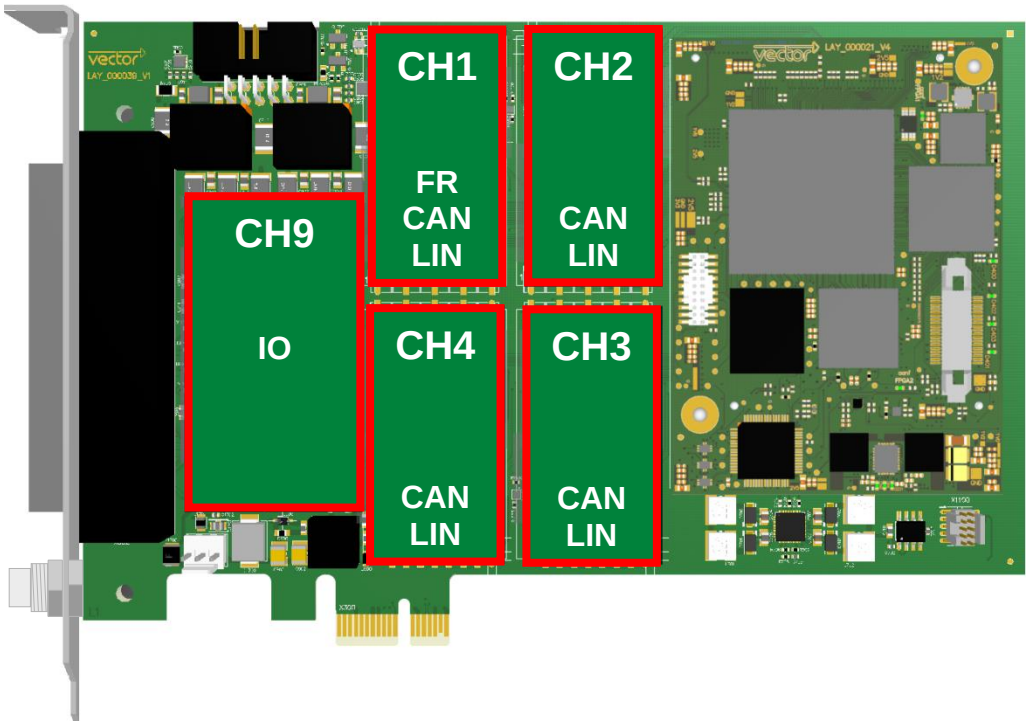


Figure 6: Piggyback plug-in locations

Note: LINpiggies have to be inserted after CANpiggies (in descending order). If you intend to use only one LINpiggy, please use the last plug-in location (CH4). J1708 should be handled like CAN.

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
Plug-in location	1	2	3	4	(fix)	(fix)	(fix)	(fix)	5
Piggyback	CAN or FR	or	or	or LIN	CAN 1051	CAN 1051	CAN 1051	CAN 1051	IO

Caution: If an FRpiggy is inserted (CH1), only two additional LINpiggies can be used (CH3/CH4). A third LINpiggy at CH2 returns a configuration error in **Vector Hardware Config**.

Examples

The following tables show examples of possible combinations:

4x CAN

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
Plug-in location	1	2	3	4	(fix)	(fix)	(fix)	(fix)	5
Piggyback	-	-	-	-	CAN	CAN	CAN	CAN	-
Channel configuration	-	-	-	-	**CAN**	**CAN**	**CAN**	**CAN**	**-**

8x CAN
1x IO

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
Plug-in location	1	2	3	4	(fix)	(fix)	(fix)	(fix)	5
Piggyback	CAN	CAN	CAN	CAN	CAN	CAN	CAN	CAN	IO
Channel configuration	**CAN**	**CAN**	**CAN**	**CAN**	**CAN**	**CAN**	**CAN**	**CAN**	**IO**

1x FlexRay
4x CAN

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
Plug-in location	1	2	3	4	(fix)	(fix)	(fix)	(fix)	5
Piggyback	FR	-	-	-	CAN	CAN	CAN	CAN	-
Channel configuration	FR	-	-	-	**CAN**	**CAN**	**CAN**	**CAN**	**-**

5x CAN
2x LIN

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
Plug-in location	1	2	3	4	(fix)	(fix)	(fix)	(fix)	5
Piggyback	CAN	-	LIN	LIN	CAN	CAN	CAN	CAN	-
Channel configuration	**CAN**	**-**	**LIN**	**LIN**	**CAN**	**CAN**	**CAN**	**CAN**	**-**

1x FR
5x CAN
2x LIN
1x IO

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
Plug-in location	1	2	3	4	(fix)	(fix)	(fix)	(fix)	5
Piggyback	FR	CAN	LIN	LIN	CAN	CAN	CAN	CAN	IO
Channel configuration	**FR**	**CAN**	**LIN**	**LIN**	**CAN**	**CAN**	**CAN**	**CAN**	**IO**

3.4.3 Technical Data

FlexRay communication-controller (analysis)	Bosch E-Ray (FPGA)
FlexRay communication-controller (startup)	Fujitsu MB88121
Memory for data transmission	2 MB
FlexRay channels	1x channel A and B
Maximum FlexRay payload	254 bytes
CAN/CAN-FD channels	Max. 8 (four configurable via Piggybacks) CAN: up to 2 Mbit/s CAN-FD: up to 8 Mbit/s
LIN channels	Max. 4 (configurable via Piggybacks), up to 330 kbit/s
Transceiver	See plug-in board (FRpiggyC, CAN/LINpiggies)
PC interface	PCIe 1x
Power supply	Internal via PCIe, 3.3 V Typ. 6 W (1x FRpiggy, 3x CANpiggy, 1x IOpiggy)
Temperature range **(ambient temperature of the device)**	Operation: -40 °C...+65 °C Storage: -40 °C...+85 °C
Dimensions (LxWxH)	127 mm x 178 mm x 18 mm
Operating system	Windows 7 (SP1), 32 bit or 64 bit Windows 8.1, 32 bit or 64 bit

4 VN7572

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4.1 Main Features

VN7572 (PCIe)

The VN7572 is a FlexRay/CAN/LIN/IO network interface for use with a PCIe slot.

Main features:

- 1x D-SUB62 connector for FlexRay, CAN/LIN and IO
- 1x Binder connector for hardware time synchronization
- 1x internal connector for hardware time synchronization
- 2x plug-in locations for FR compact Piggybacks or CAN/LINpiggies (CH1/CH2)
- 2x plug-in locations for CAN/LINpiggies (CH3/CH4)
- 4x on-board CAN high-speed 1051cap transceivers (capacitively decoupled, CH5…CH8)
- 1x plug-in location for IOpiggy (digital/analog input/output)

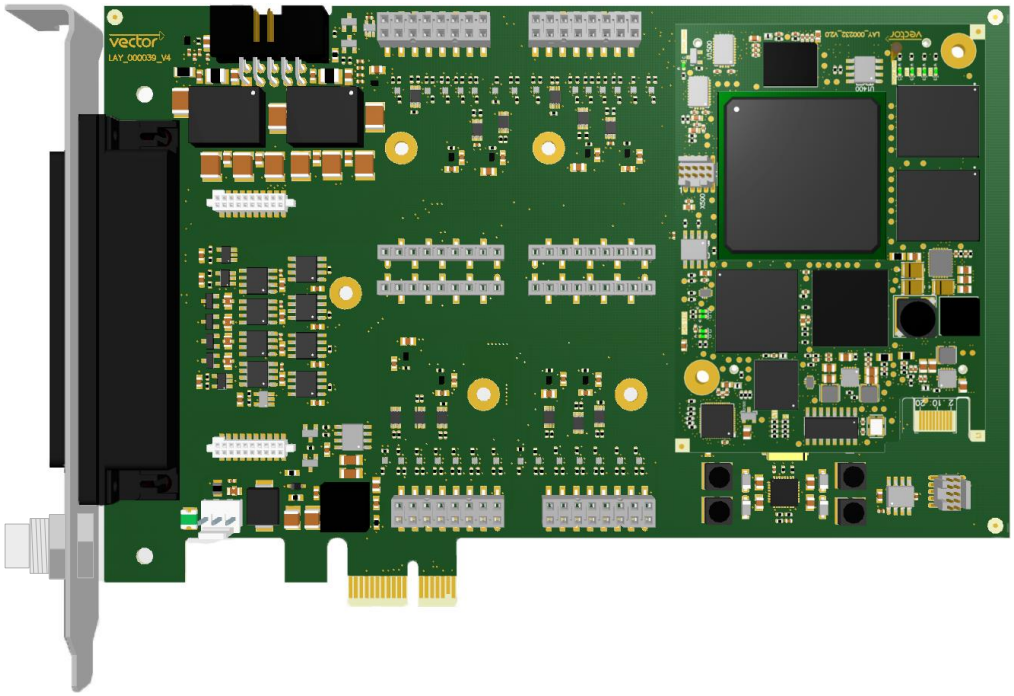


Figure 7: VN7572

4.2 Accessories

Reference: Further information on the available accessories can be found in the separate accessories manual on the driver CD in `\Documentation\Accessories`.

4.3 Getting Started

4.3.1 Step 1: Driver Installation

Please use the drivers from the included Vector Driver Disk.

1. Execute **Vector Driver Setup** from the autostart menu or directly from `\Drivers\Setup.exe` before the VN7572 is inserted into an empty PCIe slot. If you have already inserted the VN7572, the **Windows found new Hardware** wizard appears. Close this wizard and then execute the driver setup.
2. Finish the driver installation with the setup.

Note: Further information on the driver installation can be found on page 58.

4.3.2 Step 2: Device Preparation

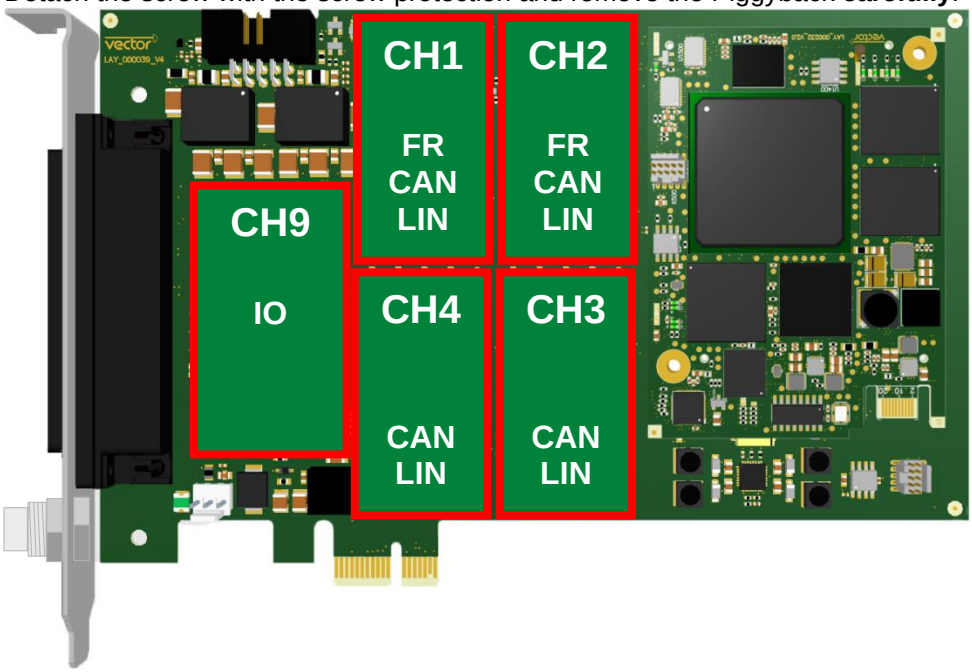
Bus types

In order to connect the device to the FlexRay/CAN/LIN bus, one or more Piggybacks with suitable transceivers have to be inserted before (see section Bus Configuration on page 32). For CAN there are also on-board transceivers available. A list of compatible Piggybacks can be found in the accessories manual on the driver CD in `\Documentation\Accessories`.

Note:
Inserting order for FRpiggies: CH1…CH2.
Inserting order for LINpiggies: CH4…CH1.
Inserting order for CAN/J1708piggies: CH1…CH4, but after FRpiggies and before LINpiggies.

Please follow these instructions if no Piggyback is inserted or if another Piggyback needs to be inserted. Do not touch the bottom and the topside of the PCBs (VN7572 main board and Piggybacks) to prevent electrical damage.

1. Detach the screw with the screw protection and remove the Piggyback **carefully**.



2. Insert the replacement Piggyback. The connectors must fit and must not be displaced laterally.
3. The Piggyback has to be fixed again with the screw and the screw protection.

4.3.3 Step 3: Device Installation

Caution: Turn off the main power supply and disconnect your computer's power cord. Otherwise systems using an ATX power supply unit with soft power off may still be powering the PCIe slot. This can damage your PCIe card when it is inserted into the slot.

Caution: Do not force the VN7572 into the slot. Make sure that the connectors of the card's PCIe connector are aligned with the bus connector on the motherboard before you insert the card into the slot. If it does not fit properly, gently remove it and try again.

Info: Please observe all safety precautions prescribed by your PC manufacturer for card installation!

Info: Do not touch the bottom and the topside of the PCBs (VN7572 main board and Piggybacks) to prevent electrical damage during assembly.

1. Install the drivers as described before.
2. Turn off the computer and all peripheral devices.
3. Unplug the power cord from the wall outlet.

4. Touch a metal plate on your computer to ground yourself to discharge any static electricity.
5. Remove the computer cover and the metal brackets from an unused slot.
6. Align the VN7572 with the PCIe slot and press it gently but firmly into the slot.
7. Replace the computer cover.
8. Plug in the power cord.
9. Turn on the computer.

4.3.4 Step 4: Device Configuration

Configuration

Before the installed device can be used in an application (e. g. CANalyzer, CANoe), it has to be properly configured for the needed use case.

This configuration and management of all installed Vector devices is done with the **Vector Hardware Config** tool which comes with the driver installation. The tool can be found in: **Windows | Start | Settings | Control Panel | Vector Hardware**.

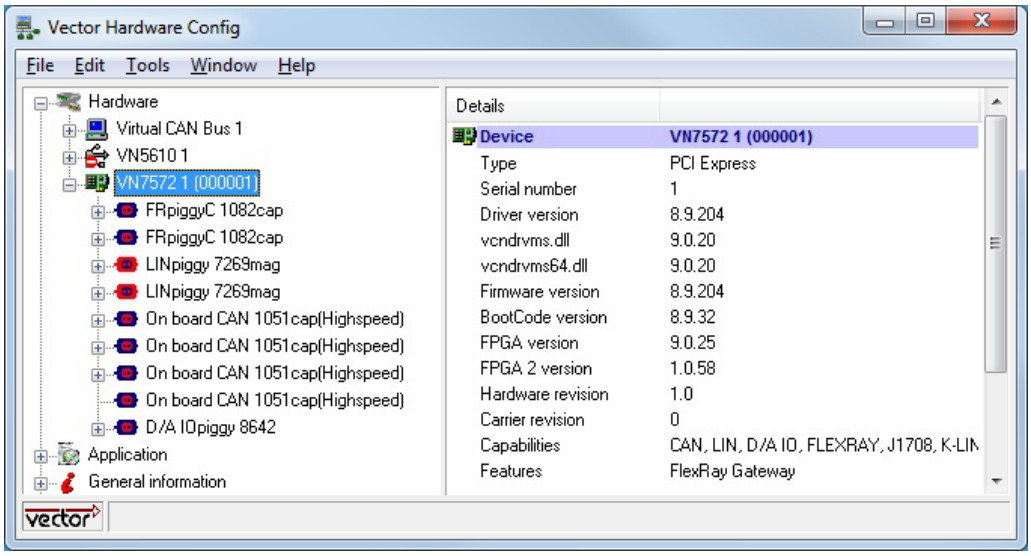


Figure 8: Configuring the device

For the quick test described in this manual no further configuration is required.

Note: Further details on the **Vector Hardware Config** tool can be found on page 63.

4.3.5 Step 5: Quick Test

Note: Please refer to the loop test for FlexRay and CAN described in the installation instructions (see page 58).

4.4 Device Description

4.4.1 Connectors

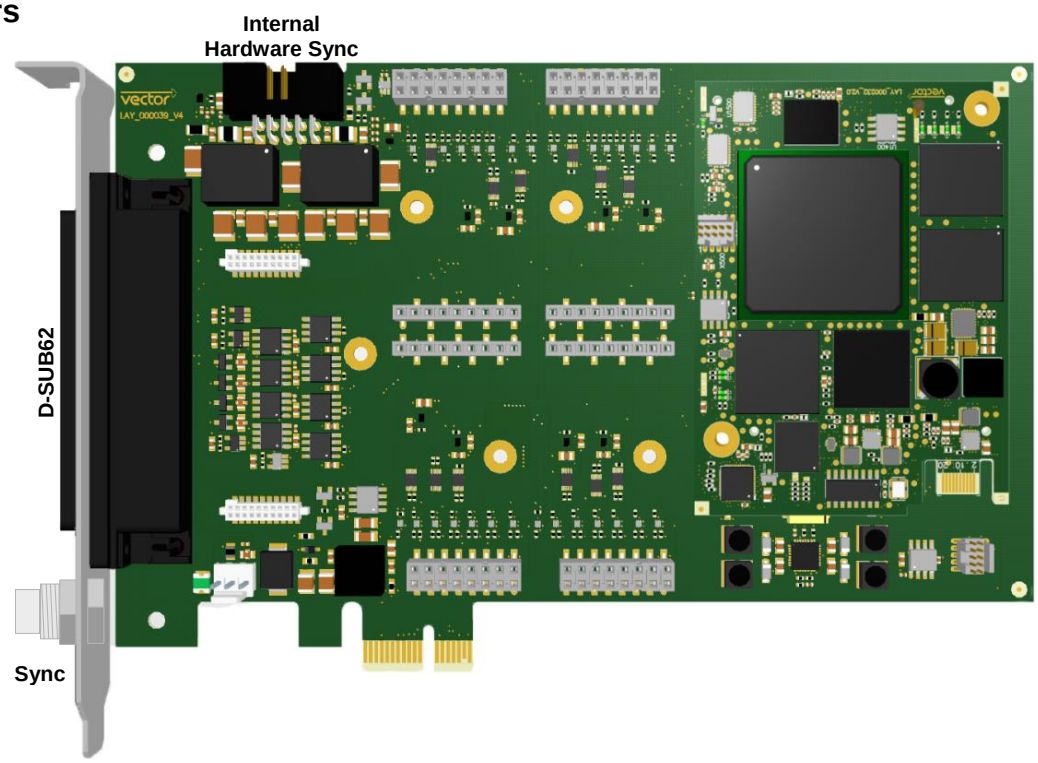


Figure 9: VN7572 connectors

➔ **D-SUB62**
The D-SUB62 connector provides all input and output pins of the inserted Piggybacks including the on-board CAN transceivers. The pins of the D-SUB62 connector are grouped as follows:

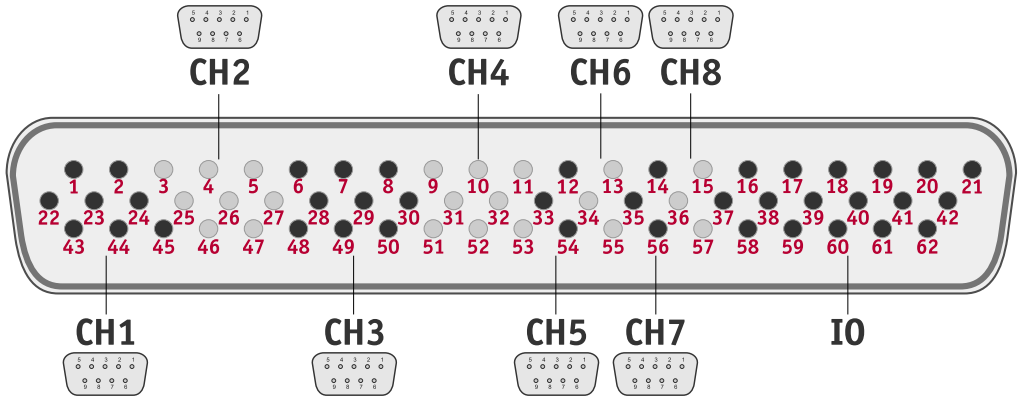


Figure 10: D-SUB62 connector pin assignments

The pin assignments of CH1…CH4 depend on the inserted Piggybacks. CH5…CH8 are assigned to the on-board CAN transceivers. The remaining pins are reserved for IO purposes and are assigned to the IOpiggy.

D-SUB62/9 Matrix

Piggyback					On-board CAN				
CH 1	CH 2	CH 3	CH 4	D-SUB9	CH 5	CH 6	CH 7	CH 8	D-SUB9
45	47	50	53	(1)*	-	-	-	-	(1) N. c.
22	3	28	9	(2)*	12	13	14	15	(2) CAN Low
1	25	7	31	(3)*	54	55	56	57	(3) GND
23	4	29	10	(4)*	-	-	-	-	(4) N. c.
6	6	6	6	(5)*	6	6	6	6	(5) Shield
2	26	8	32	(6)*	-	-	-	-	(6) N. c.
24	5	30	11	(7)*	33	34	35	36	(7) CAN High
43	27	48	51	(8)*	-	-	-	-	(8) N. c.
44	46	49	52	(9)*	-	-	-	-	(9) N. c.

* Depends on the inserted Piggyback.
Further information can be found in the separate accessories manual on the driver CD.

N. c.: Not connected

Trigger pins

The D-SUB62 connector offers up to two trigger outputs (low active, 5V/GND, max. input current 200 mA) if an FRpiggyC 1082cap is inserted (see section Bus Configuration on page 32):

- Trigger output at CH1: pin 45.
- Trigger output at CH2: pin 47.

Further information on triggers can be found in section Trigger on page 57.

Reference: Information on suitable cables and adapters can be found in the separate accessories manual on the driver CD in `\Documentation\Accessories`.

IO pins (IOpiggy)

If an IOpiggy is inserted the pin assignment at the D-SUB62 connector is as follows:

Pin	Pinout 1	Pinout 2	Pinout 3	Pinout 4
16	Digital In 1	Digital Out 1[1]	Digital Out 1[2]	-
17	Digital In 3	Digital Out 3[1]	Digital Out 3[2]	-
18	Digital In 5	Digital Out 4b[3]	-	-
19	Digital In 7	Digital Out 5b[3]	-	-
20	Digital GND			
37	Digital In 0	Digital Out 0[1]	Digital Out 0[2]	PWM 1
38	Digital In 2	Digital Out 2[1]	Digital Out 2[2]	-
39	Digital In 4	Digital Out 4a[3]	-	-
40	Digital In 6	Digital Out 5a[3]	-	-
41	PWM 0	Capture	-	-

Pin	Pinout 1	Pinout 2	Pinout 3	Pinout 4
58	Analog GND			
59	Analog In 0	Analog Out 0[1]	-	-
60	Analog In 1	Analog Out 1[1]	-	-
61	Analog In 2	-	-	-
62	Analog In 3	-	-	-

[1] Push-Pull
[2] Open-Drain
[3] a/b line: Relay switched, external signal at a is switched to b

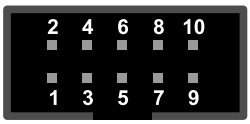
Note: Further details on the internal wiring at each IO pin can be found in the separate accessories manual on the driver CD (see section IOpiggy).

➔ **Sync**
This connector (Binder type 711) can be used for time synchronization of different Vector devices (see page 52).

Pin	Assignment
1	Not connected
2	Synchronization line (low active)
3	GND

➔ **Internal hardware sync connector**
Multiple VN7572 can also be synchronized via the internal 10-pin connector (angled) above the IOpiggy slot. For synchronization a ribbon cable with a 10-pin standard connector is required.

Pin	Assignment
1	GND
2..8	Reserved. Do not connect.
9	Synchronization line (low active)
10	Internal sync supply (output 5 V, 35 mA)



Info: The simultaneous use of the external and internal time synchronization between two devices is not possible.

4.4.2 Bus Configuration

Piggybacks for CH1…CH4

The VN7572 offers four Piggyback plug-in locations (CH1…CH4). Depending on requirements, **electrically** decoupled FlexRay, CAN High-Speed, CAN Low-Speed, CAN Single Wire, J1708 or LIN transceivers may be used. In addition, four electrically decoupled built-in CAN TJA1051 (high-speed) transceivers are available (CH5…CH8). The remaining pins are reserved for dedicated IO tasks (CH9).

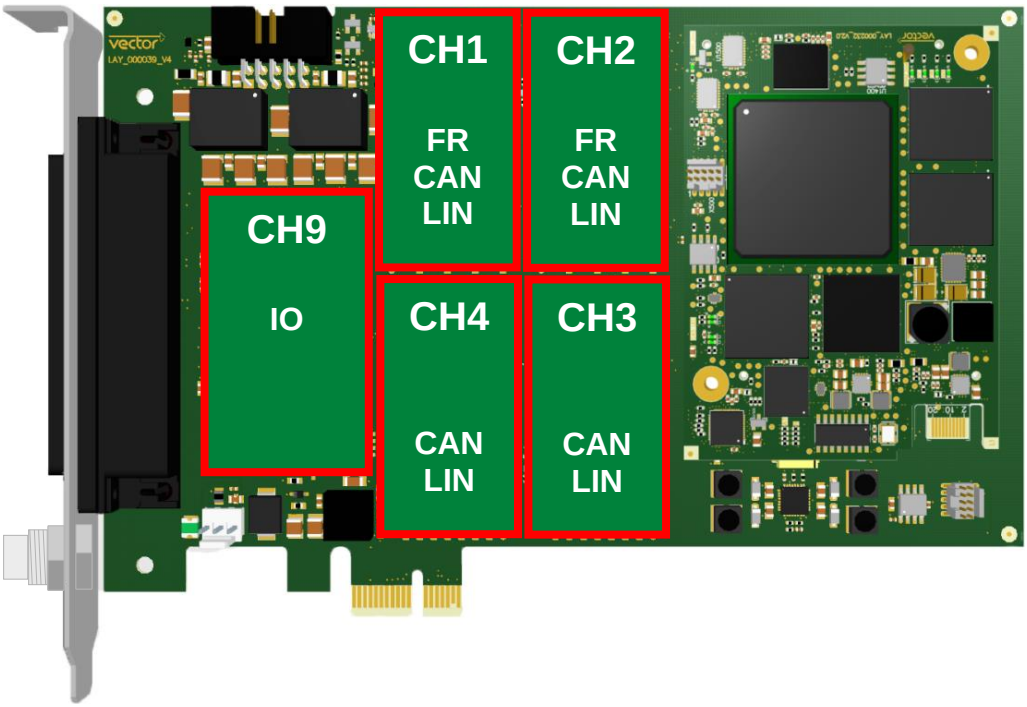


Figure 11: Piggyback plug-in locations

Note:
Inserting order for FRpiggies: CH1…CH2.
Inserting order for LINpiggies: CH4…CH1.
Inserting order for CAN/J1708piggies: CH1…CH4, but after FRpiggies and before LINpiggies.

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
Plug-in location	1	2	3	4	(fix)	(fix)	(fix)	(fix)	5
Piggyback	CAN or FR	or FR	or	or LIN	CAN 1051	CAN 1051	CAN 1051	CAN 1051	IO

Examples

The following tables show examples of possible combinations:

4x CAN

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
Plug-in location	1	2	3	4	(fix)	(fix)	(fix)	(fix)	5
Piggyback	-	-	-	-	CAN	CAN	CAN	CAN	-
Channel configuration	-	-	-	-	**CAN**	**CAN**	**CAN**	**CAN**	**-**

8x CAN
1x IO

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
Plug-in location	1	2	3	4	(fix)	(fix)	(fix)	(fix)	5
Piggyback	CAN	CAN	CAN	CAN	CAN	CAN	CAN	CAN	IO
Channel configuration	**CAN**	**CAN**	**CAN**	**CAN**	**CAN**	**CAN**	**CAN**	**CAN**	**IO**

2x FlexRay
4x CAN

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
Plug-in location	1	2	3	4	(fix)	(fix)	(fix)	(fix)	5
Piggyback	FR	FR	-	-	CAN	CAN	CAN	CAN	-
Channel configuration	FR	FR	-	-	**CAN**	**CAN**	**CAN**	**CAN**	**-**

5x CAN
2x LIN

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
Plug-in location	1	2	3	4	(fix)	(fix)	(fix)	(fix)	5
Piggyback	CAN	-	LIN	LIN	CAN	CAN	CAN	CAN	-
Channel configuration	**CAN**	**-**	**LIN**	**LIN**	**CAN**	**CAN**	**CAN**	**CAN**	**-**

2x FR
5x CAN
1x LIN
1x IO

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
Plug-in location	1	2	3	4	(fix)	(fix)	(fix)	(fix)	5
Piggyback	FR	FR	CAN	LIN	CAN	CAN	CAN	CAN	IO
Channel configuration	**FR**	**FR**	**CAN**	**LIN**	**CAN**	**CAN**	**CAN**	**CAN**	**IO**

4.4.3 Technical Data

FlexRay communication-controller (analysis)	Bosch E-Ray (FPGA)
FlexRay communication-controller (startup)	Bosch E-Ray (FPGA)
Memory for data transmission	2 MB
FlexRay channels	2x channel A and B
Maximum FlexRay payload	254 bytes
CAN/CAN-FD channels	Max. 8 (four configurable via Piggybacks) CAN: up to 2 Mbit/s CAN-FD: up to 8 Mbit/s
LIN channels	Max. 4 (configurable via Piggybacks), up to 330 kbit/s
Transceiver	See plug-in board (FRpiggyC, CAN/LINpiggies)
PC interface	PCIe 1x
Power supply	Internal via PCIe, 3.3 V Typ. 7 W (1x FRpiggy, 3x CANpiggy, 1x IOpiggy)
Temperature range **(ambient temperature of the device)**	Operation: -40 °C...+50 °C Storage: -40 °C...+85 °C
Dimensions (LxWxH)	127 mm x 178 mm x 18 mm
Operating system	Windows 7 (SP1), 32 bit or 64 bit Windows 8.1, 32 bit or 64 bit

5 VN7600

In this chapter you find the following information:

5.1	Main Features	page 36
5.2	Accessories	page 36
5.3	Getting Started	page 37
	Step 1: Driver Installation	
	Step 2: Device Preparation	
	Step 3: Device Installation	
	Step 4: Device Configuration	
	Step 5: Quick Test	
5.4	Device Description	page 40
	Connectors Bus Side	
	Connectors USB Side	
	LEDs	
	Technical Data	

5.1 Main Features

VN7600 (USB)

The VN7600 is a FlexRay/CAN network interface for use with a USB port.

Main features:

- 1x D-SUB9 connector for FlexRay (channel A and B)
- 3x D-SUB9 connector for CAN
- 2x Binder connector for power supply and hardware synchronization
- 1x Binder connector for trigger

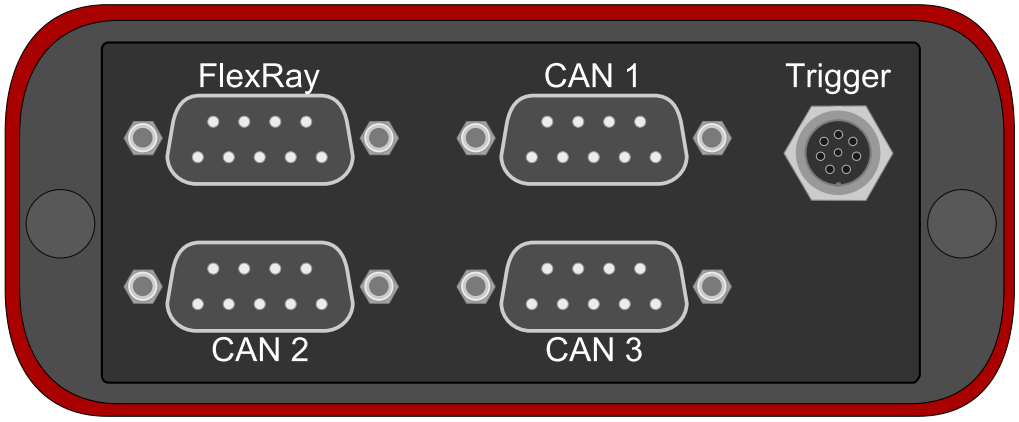


Figure 12: VN7600

5.2 Accessories

Reference: Further information on the available accessories can be found in the separate accessories manual on the driver CD in `\Documentation\Accessories`.

5.3 Getting Started

5.3.1 Step 1: Driver Installation

Please use the drivers from the included Vector Driver Disk.

1. Execute **Vector Driver Setup** from the autostart menu or directly from `\Drivers\Setup.exe` before the VN7600 is connected to the PC via USB. If you have already connected the VN7600, the **Windows found new Hardware** wizard appears. Close this wizard and then execute the driver setup.
2. Finish the driver installation with the setup.

Note: Further information on the driver installation can be found on page 58.

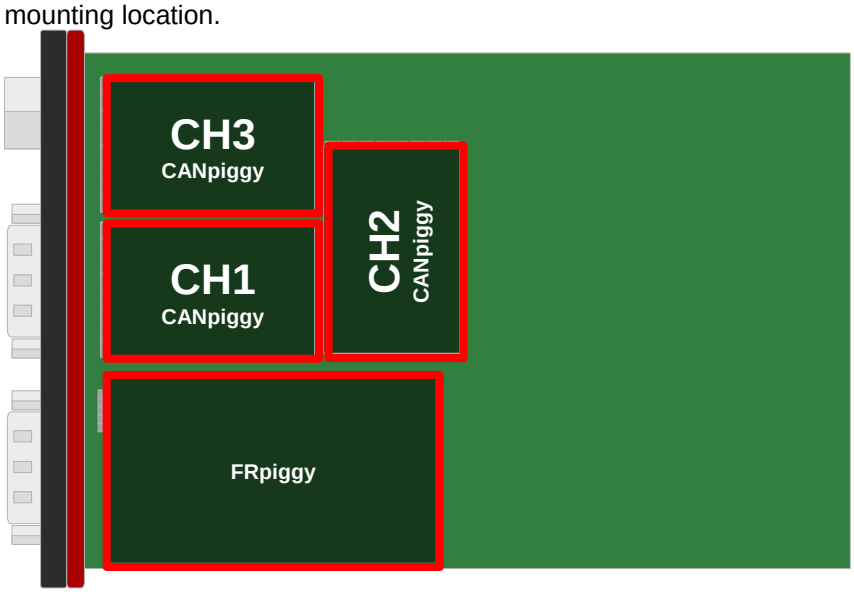
5.3.2 Step 2: Device Preparation

Bus types

In order to connect the device to the FlexRay or CAN bus, one or more Piggybacks with suitable transceivers have to be inserted before. A list of compatible Piggybacks can be found in the accessories manual on the driver CD in `\Documentation\Accessories`.

Please follow these instructions if no Piggyback is inserted or if another Piggyback needs to be inserted. Do not touch the bottom and the topside of the PCBs (VN7600 main board and Piggybacks) to prevent electrical damage.

1. First, disconnect the VN7600 from the PC and the power supply.
2. Loosen the VN7600 housing screws on the side with the D-SUB9 connector. This requires removing the two black decorative caps. Then carefully pull the PC-board out of the housing.
3. The Piggybacks are fastened by a screw and retainer. Please loosen the appropriate screw including the retainer and carefully remove the Piggyback from the mounting location.



4. Insert the replacement Piggyback. When doing this please make sure that the connectors are not laterally offset.

5. Secure the new Piggyback with the appropriate screw and retainer.
6. Place the VN7600 main board back in the housing verifying that it is inserted properly. This operation involves placing the housing on a table with its back side (side with the bar code) facing upward. Then the main board with the Piggyback is inserted into the upper guide rails.
7. It should be possible to slide the main board in the housing up to a few millimeters from the end without forcing it in. Close the housing by applying light pressure, and then secure it with the appropriate screw fasteners. The screws should be secure but not excessively tight.
8. Please also attach the two black decorative caps.

5.3.3 Step 3: Device Installation

1. Install the drivers as described before.
2. Connect the power supply and plug it into a power outlet.
3. Connect the VN7600 to a free USB2.0 port via the USB cable.

5.3.4 Step 4: Device Configuration

Configuration

Before the installed device can be used in an application (e. g. CANalyzer, CANoe), it has to be properly configured for the needed use case.

This configuration and management of all installed Vector devices is done with the **Vector Hardware Config** tool which comes with the driver installation. The tool can be found in: **Windows | Start | Settings | Control Panel | Vector Hardware**.

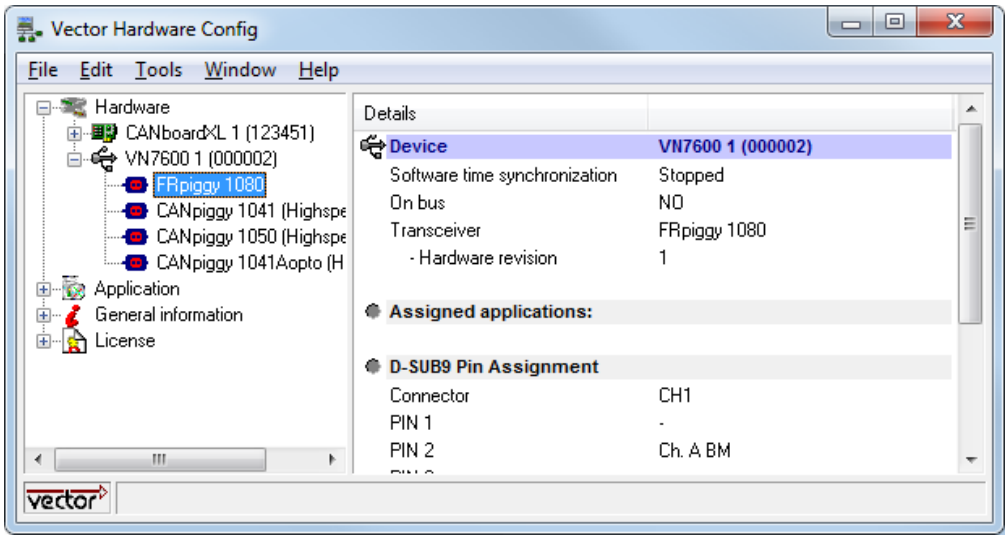


Figure 13: Configuring the device

For the quick test described in this manual no further configuration is required.

Note: Further details on the **Vector Hardware Config** tool can be found on page 63.

5.3.5 Step 5: Quick Test

Note: Please refer to the loop test for FlexRay and CAN described in the installation instructions (see page 58).

5.4 Device Description

5.4.1 Connectors Bus Side

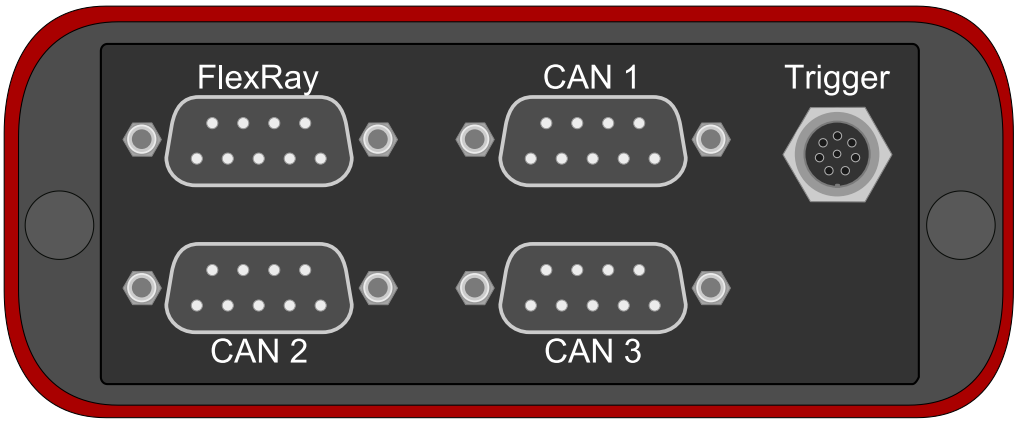
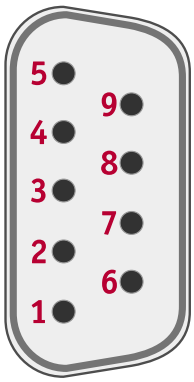


Figure 14: Main connectors

➔ **FlexRay**
D-SUB9 connector for FlexRay (channel A and B).
The pin assignment is as follows:

Pin	Assignment
1	Not connected
2	BM Channel A
3	GND
4	BM Channel B
5	Shield
6	Not connected
7	BP Channel A
8	BP Channel B
9	Not connected

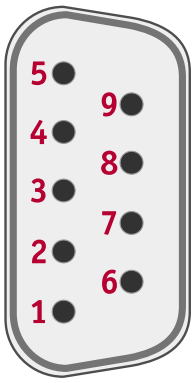


Reference: Information on suitable cables and adapters can be found in the separate accessories manual on the driver CD in `\Documentation\Accessories`.

➔ **CAN1…CAN3**
D-SUB9 connectors for CAN.
The pin assignments depend on the used Piggyback configuration inside the VN7600. Please refer to the accessories manual on the driver CD.

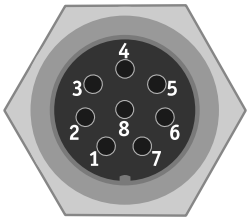
The general CAN pin assignment is as follows:

Pin	Assignment
1	Not connected
2	CAN Low
3	GND
4	Piggyback dependent
5	Shield
6	Not connected
7	CAN High
8	reserved
9	Piggyback dependent



➔ **Trigger (Binder type 711)**
See section Trigger on page 57 for further details.
The pin assignment of the connector is as follows:

Pin	Assignment	Software Port[1]
1	Output voltage 5 V (max. 35 mA)	-
2	Trigger In (TTL 5 V, low active) V_{Hmin}: 3.0 V / V_{Hmax}: 5.5 V V_{Lmin}: 0.0 V / V_{Lmax}: 0.7 V	3
3	Trigger Out (TTL 5 V, low active)	0
4	Trigger In/Out (5 V, low active) V_{Hmin}: 3.0 V / V_{Hmax}: 5.5 V V_{Lmin}: 0.0 V / V_{Lmax}: 0.7 V	1
5	Trigger In/Out (5 V, low active) V_{Hmin}: 3.0 V / V_{Hmax}: 5.5 V V_{Lmin}: 0.0 V / V_{Lmax}: 0.7 V	2
6	Reserved. Do not connect.	-
7	Reserved. Do not connect.	-
8	GND	-



[1] Used by Vector software, e. g. in CANoe

5.4.2 Connectors USB Side

Figure 15: USB and power/sync connector

➔ **2x Power/Sync**
The VN7600 has two power/sync connectors (Binder type 711) which can be used for time synchronization of different Vector devices (see page 52) or for power.

Note: The VN7600 needs to be externally supplied. It does not matter which connector is used to supply the device.

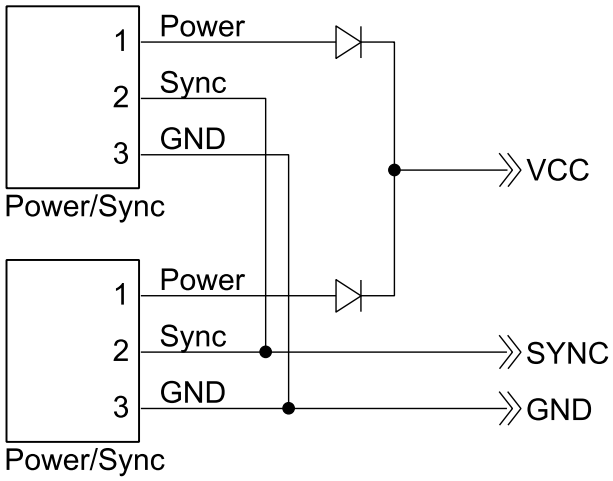


Figure 16: Schematic of the power/sync connectors

Pin	Assignment
1	Power supply
2	Synchronization line (low active)
3	GND

➔ **USB**
Connect your PC and the VN7600 via USB to install and to use the device with measurement applications (e. g. CANalyzer, CANoe).

5.4.3 LEDs

FlexRay A, B and Sync

The VN7600 has four LEDs with the following meanings:

- **FlexRay A**
  Lights up when data is received or transmitted on channel A.
- **FlexRay B**
  Lights up when data is received or transmitted on channel B.
- **Sync**
  Common LED for both FlexRay channels, which displays the state of the CC.
  - Off: Offline.
  - Green: Synchronized.
  - Orange: Not synchronized.
  - Red: Error.
- **CAN 1, 2 and 3**
  Lights up when data is received or transmitted.
- **Power**
  Displays the state of operation:
  - Green: The device is ready for operation.
  - Orange: The device is ready for host PC connection.
  - Orange (blinking): An automatic FPGA update is executed.
  - Red: Error, the device is not ready for operation.

5.4.4 Technical Data

FlexRay communication-controller (analysis)	Bosch E-Ray (Altera Cyclone II EP2C70)
FlexRay communication-controller (startup)	Fujitsu MB88121B
Memory for data transmission	2 MB
FlexRay channels	1x channel A and B
Maximum FlexRay payload	254 bytes
CAN channels	3
PC interface	USB 2.0
Power supply	External, 5 V ... 50 V (startup min. 9 V), typical 4.5 W
Temperature range	Operation*: 0 °C...+55 °C Storage: -40 °C...+85 °C * Based on tests an operating temperature range of -20 °C ... +70 °C is possible, due to components used the guaranteed operational temperature range is 0 °C ... +55 °C.
Dimensions (LxWxH)	151 mm x 110 mm x 45 mm
Operating system	Windows 7 (SP1), 32 bit or 64 bit Windows 8.1, 32 bit or 64 bit

Info: The temperature of single housing parts may be higher than the temperature of the environment, even if the device is correctly operated.

6 VN7610

In this chapter you find the following information:

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	Step 2: Device Installation	
	Step 3: Device Configuration	
	Step 4: Quick Test	
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	Connectors	
	Pin Assignment CH1 and CH2	
	LEDs	
	Technical Data	

6.1 Main Features

VN7610 (USB)

The VN7610 is a FlexRay/CAN high-speed network interface for use with a USB port.

Main features:

- 1x FlexRay (channel A and B)
  with 1082cap transceiver (capacitively decoupled)
- 1x CAN high-speed
  with 1051cap transceiver (capacitively decoupled)
- Software sync

Figure 17: VN7610 FR/CAN Interface

6.2 Accessories

Reference: Further information on the available accessories can be found in the separate accessories manual on the driver CD in `\Documentation\Accessories`.

6.3 Getting Started

6.3.1 Step 1: Driver Installation

Please use the drivers from the included Vector Driver Disk.

1. Execute **Vector Driver Setup** from the autostart menu or directly from `\Drivers\Setup.exe` before the VN7610 is connected to the PC via USB. If you have already connected the VN7610, the **Windows found new Hardware** wizard appears. Close this wizard and then execute the driver setup.
2. Finish the driver installation with the setup.

Note: Further information on the driver installation can be found on page 58.

6.3.2 Step 2: Device Installation

1. Install the drivers as described before.
2. Connect the power supply and plug it into a power outlet.
3. Connect the VN7610 to a free USB2.0 port via the USB cable.

6.3.3 Step 3: Device Configuration

Configuration

Before the installed device can be used in an application (e. g. CANalyzer, CANoe), it has to be properly configured for the needed use case.

This configuration and management of all installed Vector devices is done with the **Vector Hardware Config** tool which comes with the driver installation. The tool can be found in: **Windows | Start | Settings | Control Panel | Vector Hardware**.

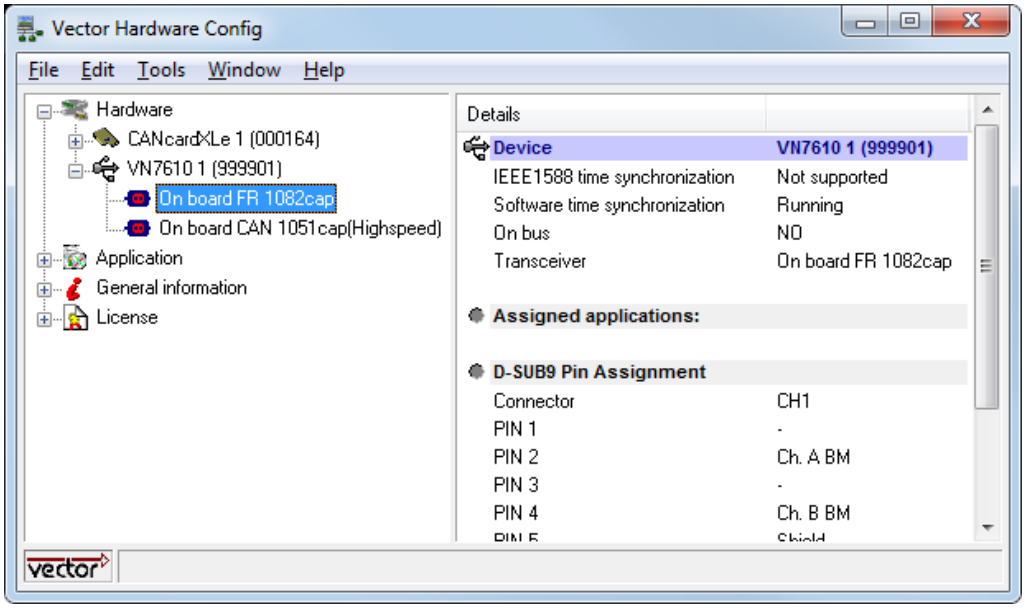


Figure 18: Configuring the device

For the quick test described in this manual no further configuration is required.

Note: Further details on the **Vector Hardware Config** tool can be found on page 63.

6.3.4 Step 4: Quick Test

Note: Please refer to the loop test for FlexRay and CAN described in the installation instructions (see page 58).

6.4 Device Description

6.4.1 Connectors

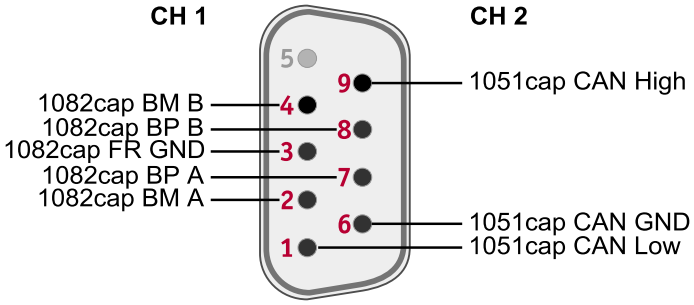
- **D-SUB9 (CH1/2)**
  The VN7610 has a D-SUB9 connector with one FlexRay channel (CH1) and one CAN high-speed channel (CH2). Further information on the pin assignment for CH1/CH2 can be found below.
- **USB**
  Connect your PC and the VN7610 via USB to install and to use the device with measurement applications (e. g. CANoe, CANalyzer).

6.4.2 Pin Assignment CH1 and CH2

D-SUB9 connector

The pin assignment of the D-SUB9 connector (CH1 and CH2) is as follows:

CH1/CH2



Y cable

Use the FR/CANcable 2Y to access both channels on separate D-SUB9 connectors (see accessories manual, part number 05099).

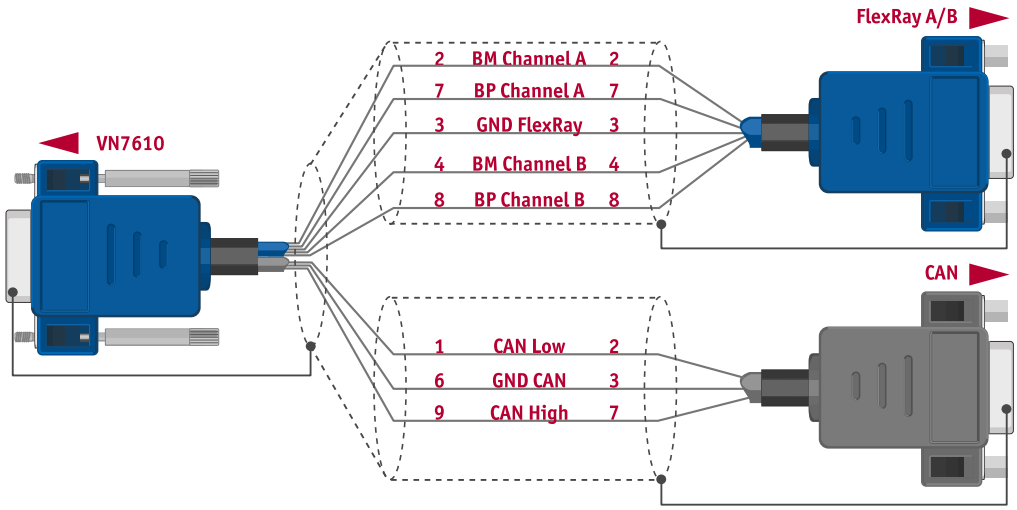


Figure 19: FR/CANcable 2Y

6.4.3 LEDs

FlexRay

Color	Description
Green	FlexRay Communication Controller synchronized.
Orange	FlexRay Communication Controller not synchronized or errors on bus.
Red	Error.

CAN

Color	Description
Green	Data frames have been sent or received correctly. The flashing frequency varies according to the message rate.
Orange	Error frames have been sent or received. The flashing frequency varies according to the message rate.
Red	Bus Off.

Status

Color	Description
Green	Device is ready for operation/running measurement.
Orange	Hardware initialization completed. Waiting for device driver.
Red	Error. Device not working.

6.4.4 Technical Data

FlexRay communication-controller (analysis)	Bosch E-Ray (FPGA)
FlexRay communication-controller (startup)	Bosch E-Ray (FPGA)
FlexRay channels	1x channel A and B
CAN channels	1x CAN high-speed CAN: up to 2 Mbit/s CAN-FD: up to 8 Mbit/s
Power supply	Internal via USB, typical 2 W
Temperature range	Operating: -40 °C...+50 °C Shipping and storage: -40 °C...+85 °C
Dimensions (LxWxH)	65 mm x 42 mm x 20 mm
Weight	Approx. 80 g
Operating system requirements	Windows 7 (SP1), 32 bit or 64 bit Windows 8.1, 32 bit or 64 bit

7 Common Features

In this chapter you find the following information:

7.1	Time Synchronization General Information Software Sync Hardware Sync	page 52

7.1 Time Synchronization

7.1.1 General Information

Time stamps and events

Time stamps are useful when analyzing incoming or outgoing data or event sequences on a specific bus.

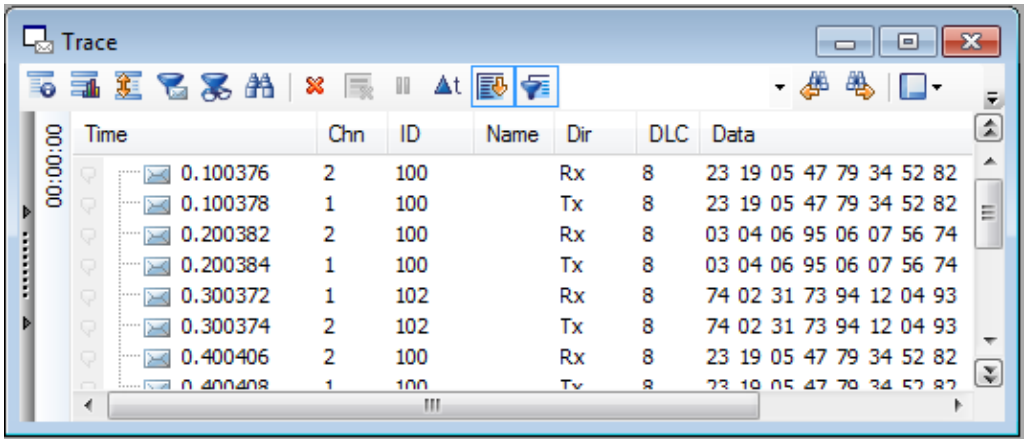


Figure 20: Time stamps of two CAN channels in CANalyzer

Generating time stamps

Each event which is sent or received by a Vector network interface has an accurate time stamp. Time stamps are generated for each channel in the Vector network interface. The base for these time stamps is a common hardware clock in the device.

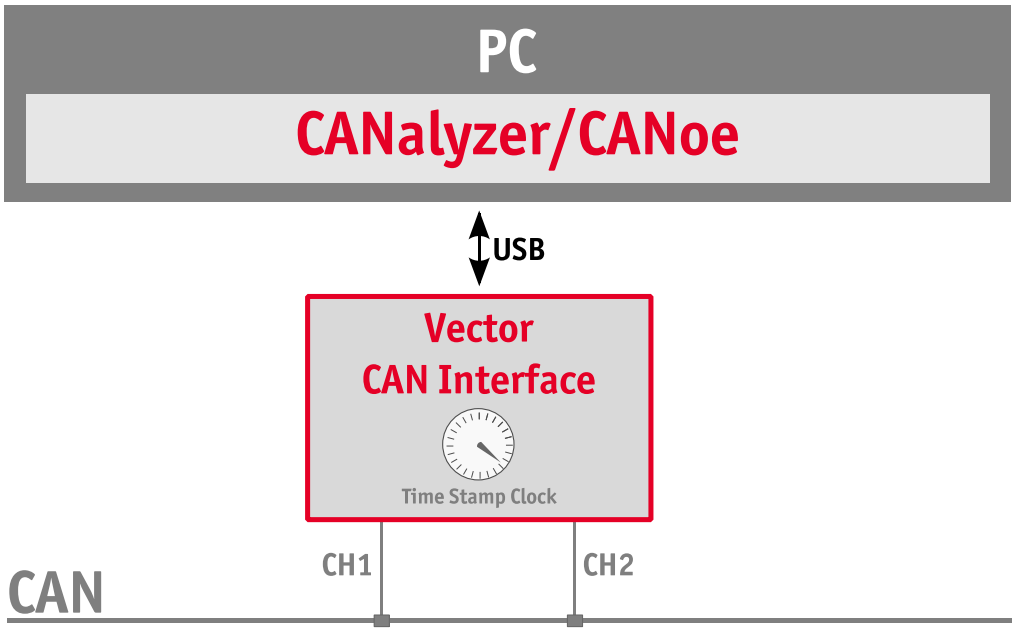


Figure 21: Common time stamp clock for each channel

If the measurement setup requires more than one Vector network interface, a synchronization of all connected interfaces and their hardware clocks is needed.

Due to manufacturing and temperature tolerances, the hardware clocks may vary in speed, so time stamps of various Vector devices drift over time.

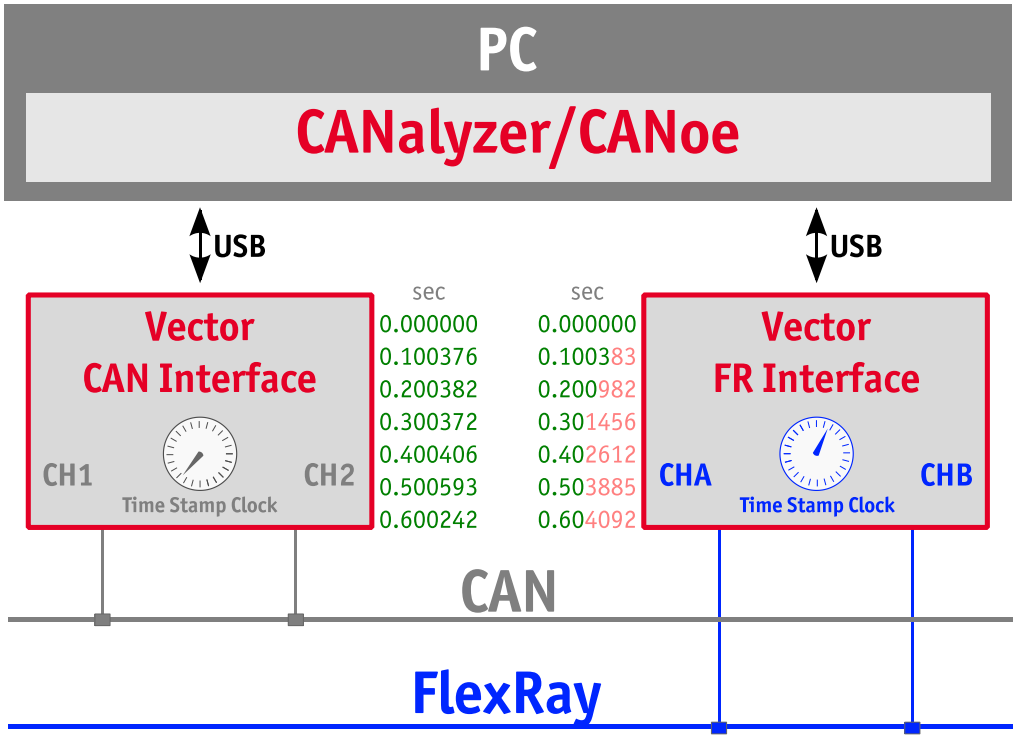


Figure 22: Example of unsynchronized network interfaces. Independent time stamps drift apart

To compensate for these time stamp deviations between the Vector network interfaces, the time stamps can be either synchronized by software or by hardware (see next section).

Note: The accuracy of the **software sync** is typically in range of **100 µs**.

Note: The accuracy of the **hardware sync** is typically in range of **1 µs**.

7.1.2 Software Sync

Synchronization by software

The software time synchronization is driver-based and available for all applications without any restrictions. The time stamp deviations from different Vector network interfaces are calculated and synchronized to the common PC clock. For this purpose no further hardware setup is required.

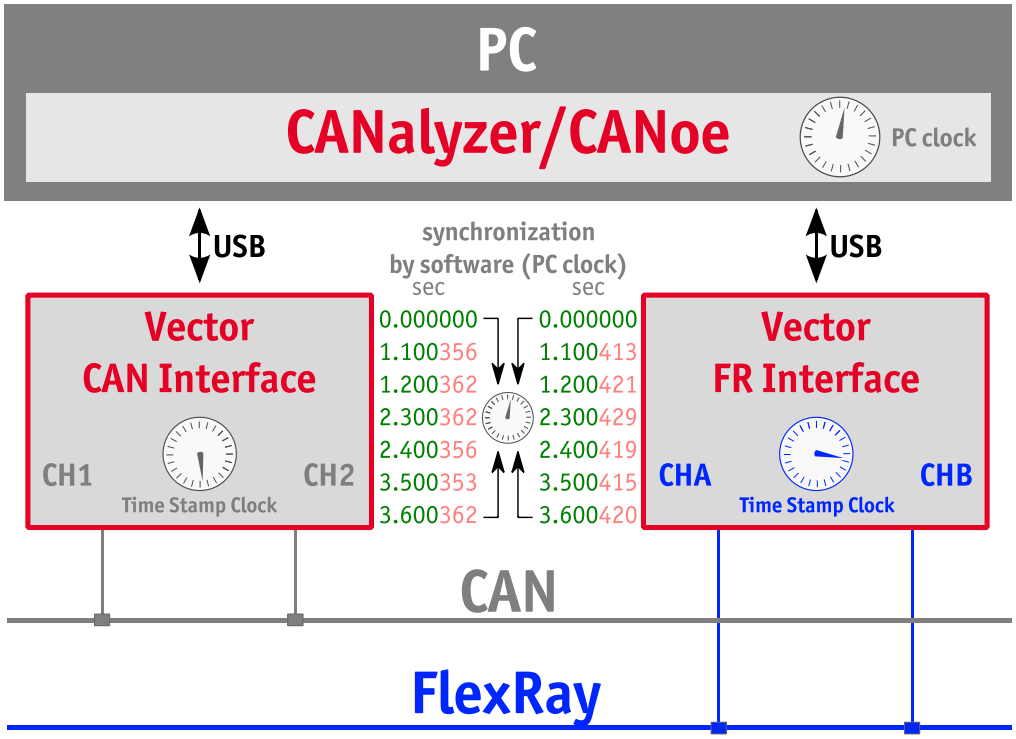


Figure 23: Time stamps of devices are synchronized to the PC clock (accuracy in range of 100 µs)

The setting of the software time synchronization can be changed in the **Vector Hardware Config** tool in **General information | Settings | Software time synchronization**.

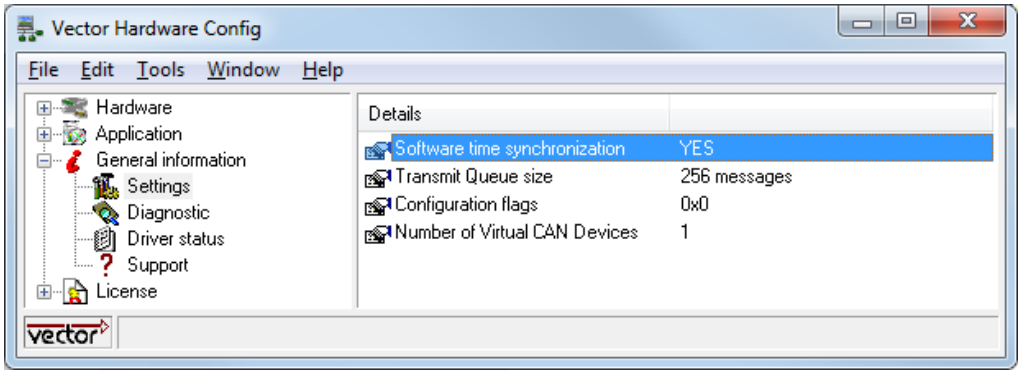


Figure 24: Switching on the software synchronization

➔ **YES**
The software time synchronization is active.

➔ **NO**
The software time synchronization is not active.
Use this setting only if the Vector network interfaces are being synchronized over the sync line or if only a single device is used.

7.1.3 Hardware Sync

Synchronization by hardware

A more accurate time synchronization of multiple devices is provided by the hardware synchronization which has to be supported by the application (e. g CANalyzer, CANoe). Two Vector network interfaces can therefore be connected with the SYNC-cableXL (see accessories manual, part number 05018).

In order to synchronize up to five devices at the same time, a distribution box is available (see accessories manual, part number 05085).

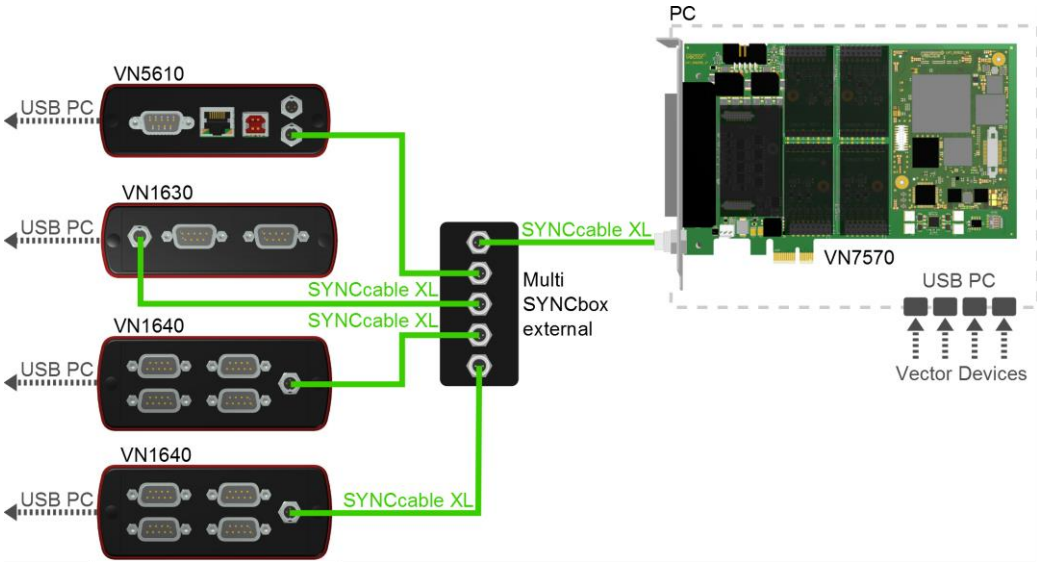


Figure 25: Example of a time synchronization with multiple devices

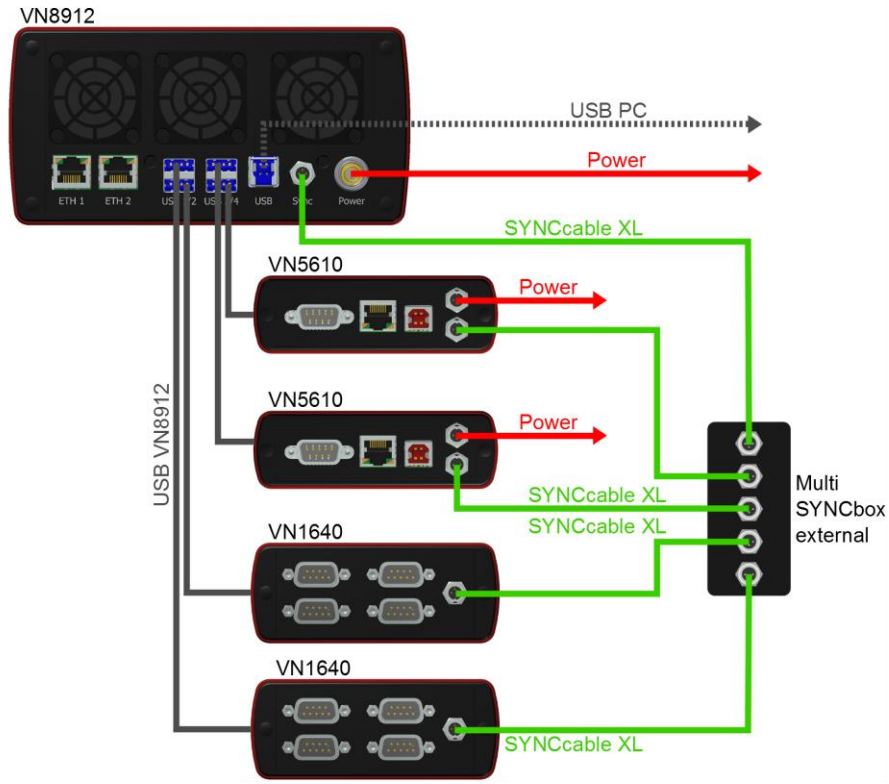


Figure 26: Example of a time synchronization with VN8912 and additional devices

At each falling edge on the sync line which is initiated by the application, the Vector network interface generates a time stamp that is provided to the application. This allows the application to calculate the deviations between the network interfaces and to synchronize the time stamps to a common time base (master clock) which is defined by the application.

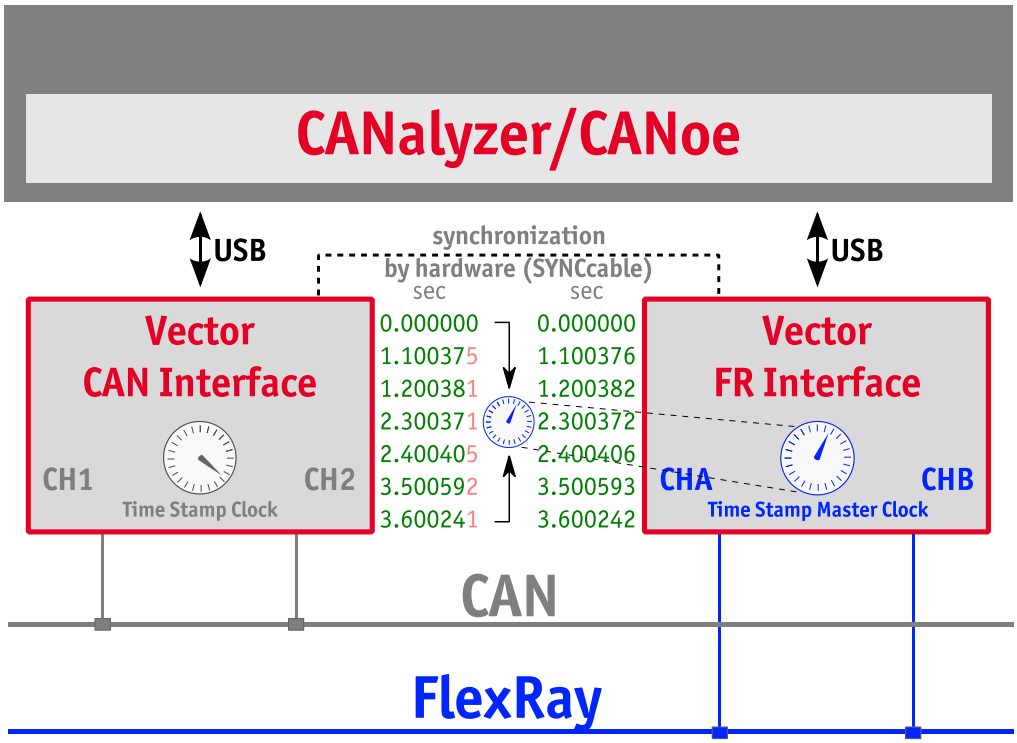


Figure 27: Time stamps are synchronized to the master clock (accuracy in range of 1 µs)

Note: The hardware synchronization must be supported by the application. For further information please refer to the relevant application manual. Please note that the software synchronization must be disabled (see **Vector Hardware Config | General information | Settings | Software time synchronization**) if the hardware synchronization is used.

7.2 Trigger

Trigger

The FlexRay interface family offers several pins for dedicated trigger applications (see the according pin assignment).

The configuration of the triggers and their actions is set in the application (e. g. CANoe). The following picture depicts the internal circuit of a trigger pin.

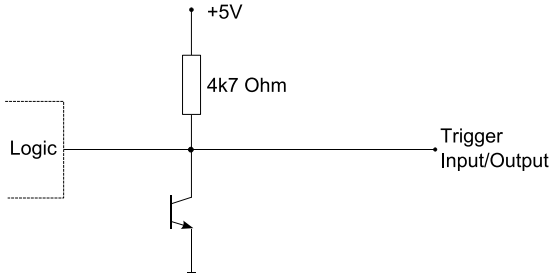


Figure 28: Trigger input and output

Input

If the trigger pin is used for input, the trigger will be fired by a falling edge on the trigger line. The trigger is processed inside the application. If the trigger input is being wired, the internal 4.7 kOhm resistor must be kept in mind.

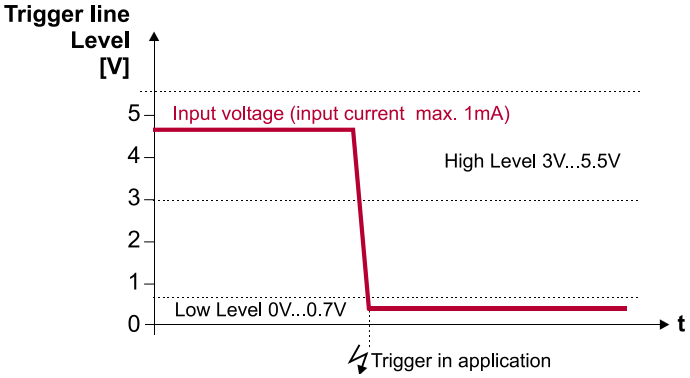


Figure 29: Trigger input

Output

If the trigger pin is used for output, the trigger of the application releases a falling edge on the trigger line. By using external pull up resistors, the maximum allowed load is 5 mA.

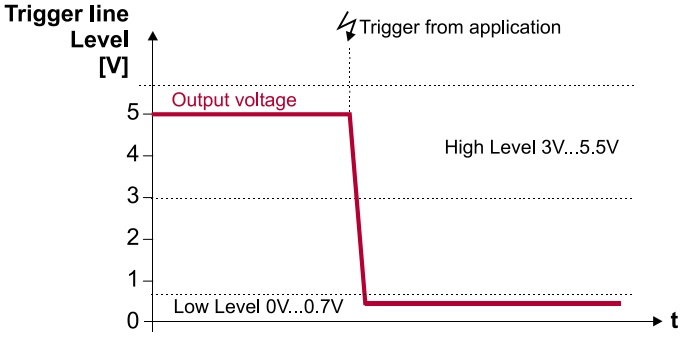


Figure 30: Trigger output

8 Driver Installation

In this chapter you find the following information:

8.1	Minimum Requirements	page 59
8.2	Hints page 60	
8.3	Vector Driver Setup	page 61
8.4	Vector Hardware Configuration	page 63
8.5	Loop Tests CAN FlexRay MOST Ethernet	page 65

8.1 Minimum Requirements

Hardware

CPU	Pentium 4 or higher
Memory	512 MB or more
Network interface	CANcardXL : PCMCIA CANcardXLe : ExpressCard 54 CANboardXL PCI : PCI CANboardXL PCIe : PCI Express x1 CANboardXL pxi : Compact PCI/PXI CANcaseXL : USB CANcaseXL log : USB VN1610 : USB VN1611 : USB VN1630A : USB VN1640A : USB VN2610 : USB VN2640 : USB VN3300 : PCI VN3600 : USB VN5610 : USB VN7570 : PCI Express x1 VN7572 : PCI Express x1 VN7600 : USB VN7610 : USB VN8910A : USB VN8912 : USB

Software

Operating system	Windows 7 (32/64 bit) Windows 8.1 (32/64 bit)
Driver version	8.x
Measurement application	The devices can be run with several applications from Vector (e. g. CANoe, CANalyzer) or with measurement applications from other companies. The devices require a related license. Applications based on the Vector XL Driver Library can be run without a license.

8.2 Hints

Note: Many desktop PCs have power managers which block the CPU for a specific time. This impairs accuracy of the time system. If your application has stringent timing requirements (e. g. time-driven sending of messages or time-driven evaluations), you have to deactivate these power managers. Power management settings may be contained in the BIOS setup or on the Control Panel of Windows 7 / Windows 8.1 (e. g. Power options).

No further mention will be made of the power manager in this document.

Info: Please note that you will need **Administrator Rights** for the following steps.

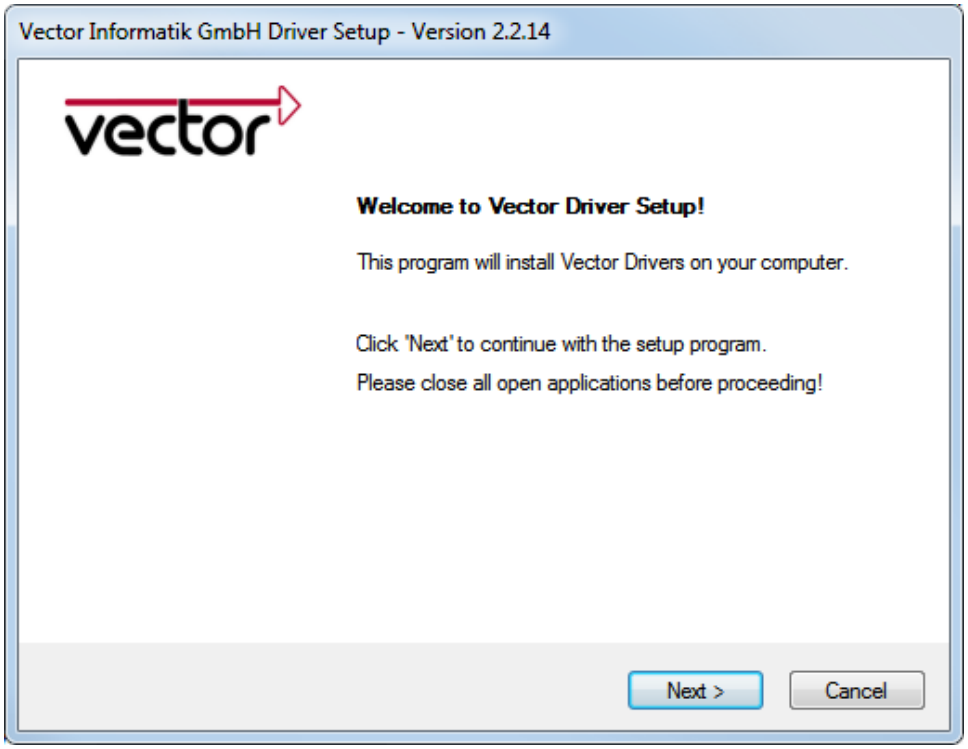
8.3 Vector Driver Setup

General information

The Vector Driver Disk offers a driver setup which allows the installation or the removal of Vector devices.

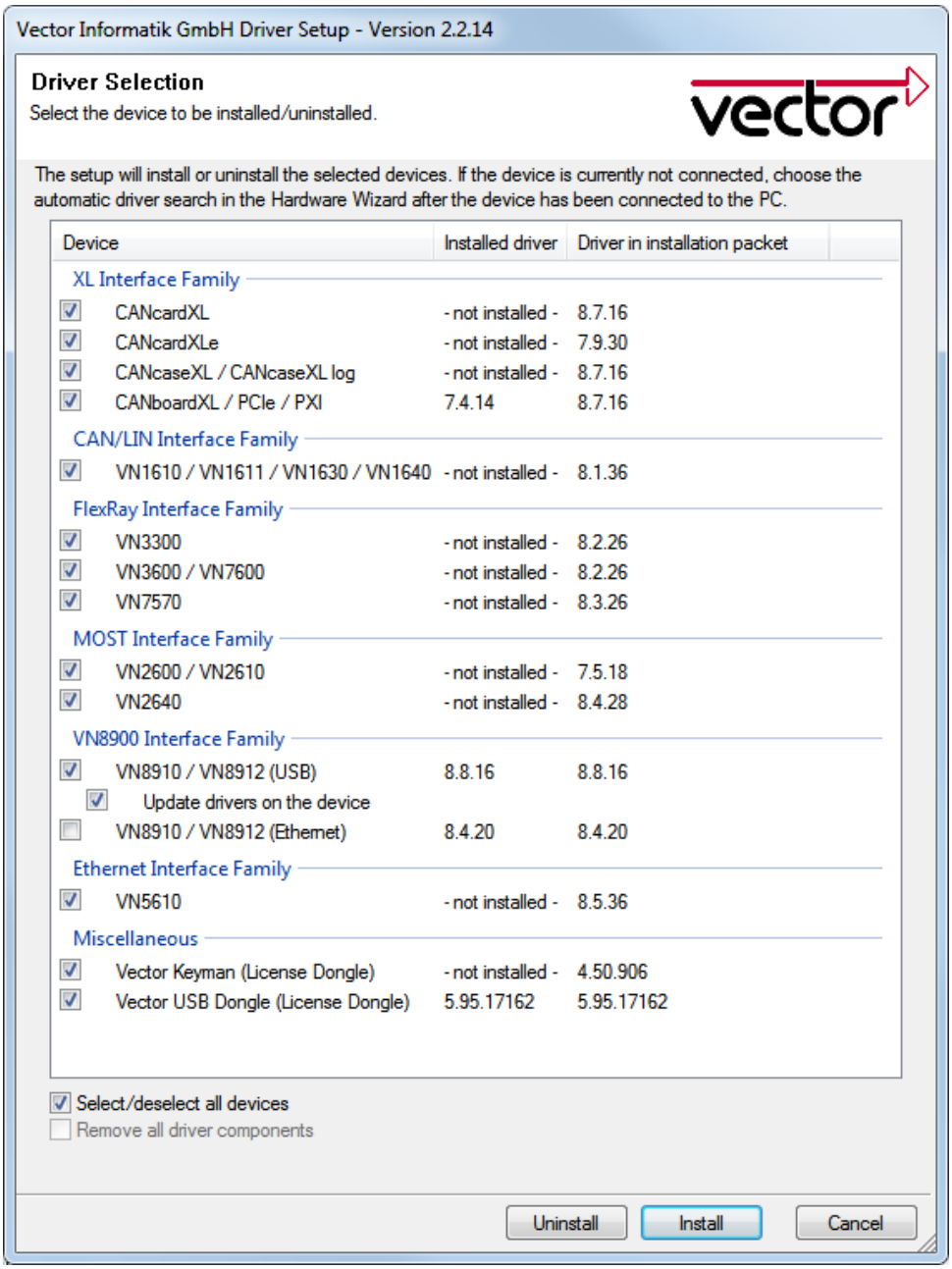
1. Execute the driver setup from the autostart menu or directly from `\Drivers\Setup.exe` before the device is inserted or connected to the PC with the included USB cable.

   If you have already inserted or connected the device to the PC, the **Windows found new Hardware** wizard appears. Close this wizard and then execute the driver setup.


Vector Informatik GmbH Driver Setup - Version 2.2.14
vector
Welcome to Vector Driver Setup!
This program will install Vector Drivers on your computer.
Click 'Next' to continue with the setup program.
Please close all open applications before proceeding!
Next >
Cancel

2. Click **[Next]** in the driver setup dialog. The initialization process starts.

3. In the driver selection dialog select your devices to be installed (or to be uninstalled).


Vector Informatik GmbH Driver Setup - Version 2.2.14
Driver Selection
Select the device to be installed/uninstalled.
vector
The setup will install or uninstall the selected devices. If the device is currently not connected, choose the automatic driver search in the Hardware Wizard after the device has been connected to the PC.
Device
Installed driver
Driver in installation packet
XL Interface Family
CANcardXL - not installed - 8.7.16
CANcardXLe - not installed - 7.9.30
CANcaseXL / CANcaseXL log - not installed - 8.7.16
CANboardXL / PCIe / PXI 7.4.14 8.7.16
CAN/LIN Interface Family
VN1610 / VN1611 / VN1630 / VN1640 - not installed - 8.1.36
FlexRay Interface Family
VN3300 - not installed - 8.2.26
VN3600 / VN7600 - not installed - 8.2.26
VN7570 - not installed - 8.3.26
MOST Interface Family
VN2600 / VN2610 - not installed - 7.5.18
VN2640 - not installed - 8.4.28
VN8900 Interface Family
VN8910 / VN8912 (USB) 8.8.16 8.8.16
Update drivers on the device
VN8910 / VN8912 (Ethernet) 8.4.20 8.4.20
Ethernet Interface Family
VN5610 - not installed - 8.5.36
Miscellaneous
Vector Keyman (License Dongle) - not installed - 4.50.906
Vector USB Dongle (License Dongle) 5.95.17162 5.95.17162
Select/deselect all devices
Remove all driver components
Uninstall
Install
Cancel

4. Click **[Install]** to execute the driver installation, or **[Uninstall]** to remove existing drivers.

5. A confirmation dialog appears. Click **[Close]** to exit.
If the driver has been installed properly, the device can be inserted or connected to the PC with the included USB cable. The device is ready for operation now.

8.4 Vector Hardware Configuration

Executing Vector Hardware Config

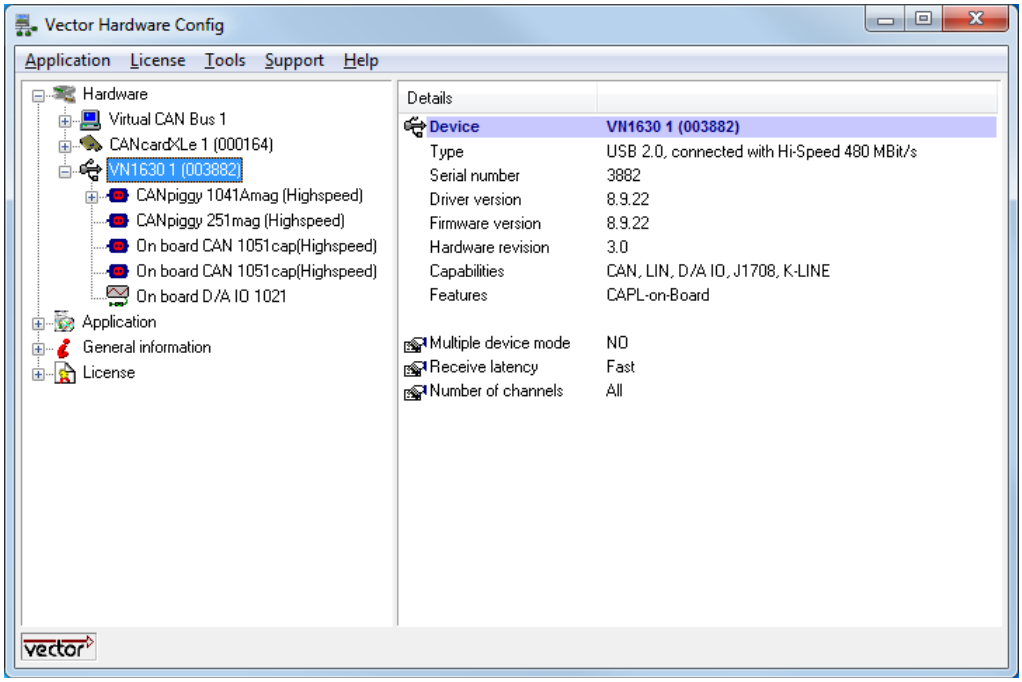
After the successful installation you will find the configuration application **Vector Hardware** in the Control Panel (see below). The tool gives you information about the connected and installed Vector devices. There are also several settings that can be changed.

Control panel Windows 7

- Category view
  Windows Start | Control Panel | Hardware and Sound, click **Vector Hardware** in the list.
- Symbols view
  Windows Start | Control Panel, click **Vector Hardware** in the list.

Control panel Windows 8.1

- Category view
  <Windows key>+<X> | Control Panel | Hardware and Sound, click **Vector Hardware** in the list.
- Symbols view
  <Windows key>+<X> | Control Panel, click **Vector Hardware** in the list.



The tool is split into two windows. The left window lets you access the installed Vector devices, the right window displays the details of the selection. The following nodes are available in the left window:

Hardware

Each installed Vector device is shown in **Hardware**. Additional details of available channels are shown in a tree view. Status information on the device components and the channels are also shown in this dialog.

Application

In **Application**, all available applications are shown with their configured channels. If you click on an application, all of its channels are displayed in the right pane on the screen.

General information

The **General information** section contains general information on Vector devices and

applications.

License

The **License** section contains information on all current valid licenses.

Note: You will find a detailed description of **Vector Hardware Config** in the online help (**Help | Contents**).

8.5 Loop Tests

Operating test

The test described here can be performed to check the functional integrity of the driver and the device. This test is identical for Windows 7 / Windows 8.1 and independent of the used application.

8.5.1 CAN

Device test

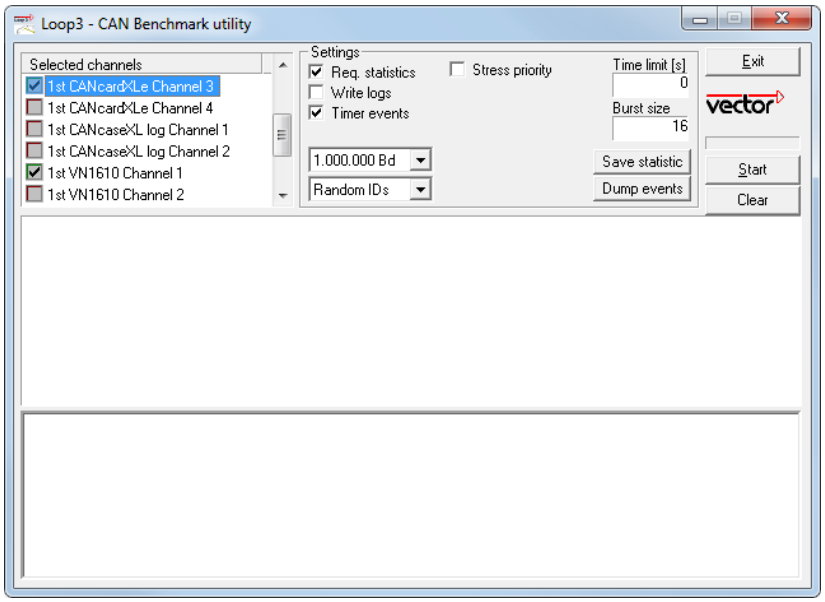
The operating test for CAN can be executed with the following devices:

- CANcardXL
- CANcardXLe
- CANcaseXL
- CANcaseXL log
- CANboardXL Family
- VN1610
- VN1630A
- VN1640A
- VN5610
- VN7570
- VN7572
- VN7600
- VN8910A
- VN8912

Loop3.exe

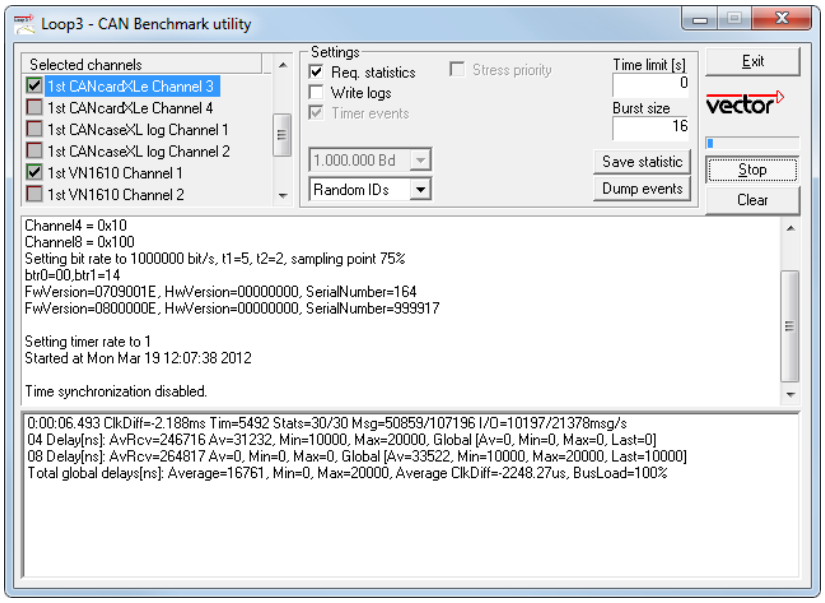
Either two High-Speed or two Low-Speed transceivers are necessary for this functional test:

1. Connect two CAN channels with a suitable cable. If two High-Speed transceivers are being used, we recommend our CANcable 1 (CANcable 0 for Low-Speed transceivers).
2. Start `\Drivers\Common\Loop3.exe` from the driver CD.
   This program accesses the Vector devices and transmits CAN messages.
3. Select the connected CAN channels of the device(s) to be tested.
4. Set the appropriate baudrate depending on the transceiver being used (High-Speed max. 1,000,000 Bd, Low-Speed max. 125,000 Bd).

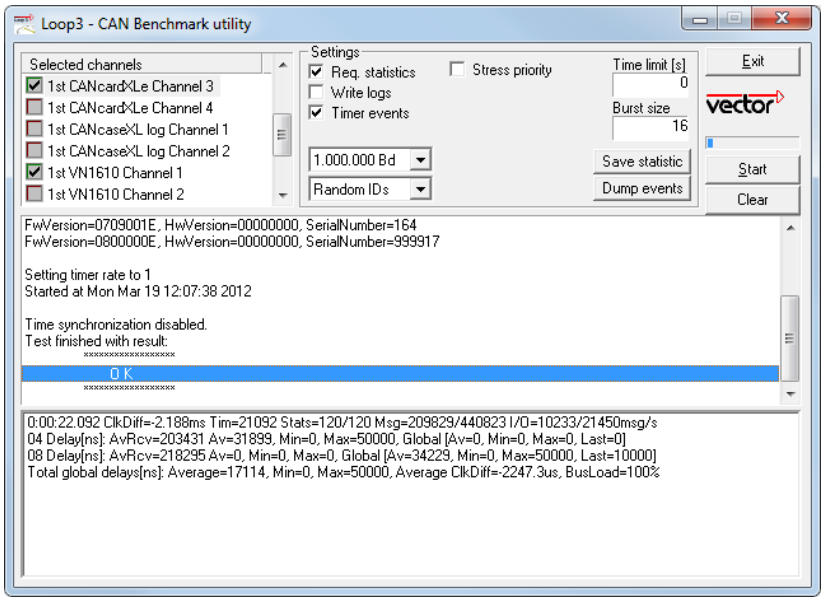


5. Click **[Start]**.
6. You will see statistical data in the lower part of the window if the system has been configured properly.

Loop3 application



7. The test procedure can be terminated with the **[Stop]** button.
   An **OK** should appear in the upper part of the window.



8.5.2 FlexRay

Device test

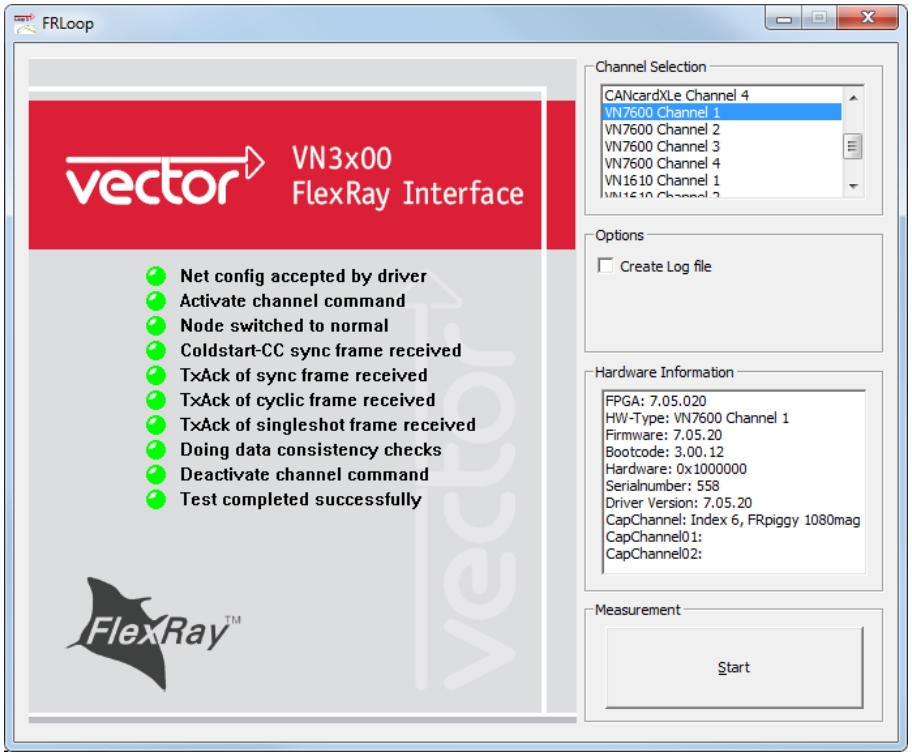
The operating test for FlexRay can be executed with the following devices:

- VN3300
- VN3600
- VN7570
- VN7572
- VN7600
- VN7610
- VN8910A with VN8970
- VN8912 with VN8970/VN8972

FRLoop.exe

This operating test requires an inserted FRpiggy.

1. Remove the FlexRay cable if it is connected.
2. Start `\Drivers\Common\FRLoop.exe` from the driver CD.
3. Execute the test.
4. If no error messages occur, the operating test was successful.



8.5.3 MOST

Device test

The operating test for MOST can be executed with the following devices:

- VN2610
- VN2640

MLoop.exe

This functional test requires a MOST fiber optic cable and a fiber coupler for HFBR connectors.

1. VN2610
   Start `\Drivers\Common\MLoop.exe` from the driver CD

   VN2640
   Start `\Drivers\Common\M150Loop.exe` from the driver CD.
2. Select the VN2610/VN2640 to be tested from the list of detected devices.
3. Click **[Twinkle]** and check if the power LED of the VN2610/VN2640 is blinking at least for one second.
4. Connect the MOST fiber optic cable with the VN2610/VN2640 device, select **Master** mode and check if the program displays the status **Unlock**. Check if red light comes out of the TX fiber of the MOST fiber optic cable.
5. Connect both ends of the fiber with one fiber coupler to a ring and check if the program displays the status **Lock**.
6. Close `MLoop.exe` with **[Exit]**.

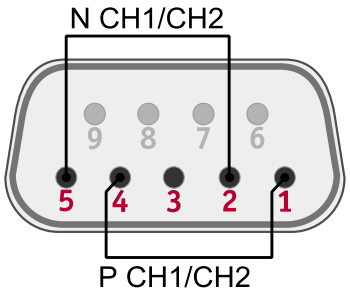
8.5.4 Ethernet

Device test

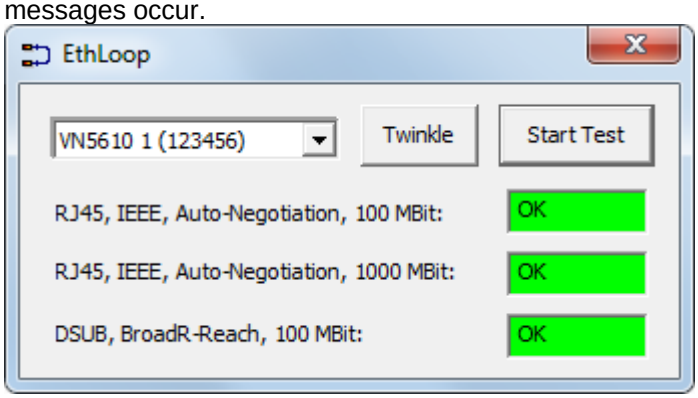
The operating test for Ethernet can be executed with the following devices:

➔ VN5610

1. Connect both Ethernet channels of the VN5610 with an Ethernet cable.
2. Connect both BroadR-Reach channels at the D-SUB9 connector as follows:



3. Start `\Drivers\Common\ETHloop.exe` from the driver CD.
4. Select an installed VN5610 from the list.
5. Press **[Twinkle]** and check if the LED **Status** blinks.
6. Start the test by pressing the button **[Start Test]**. The test is successful if no error messages occur.



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